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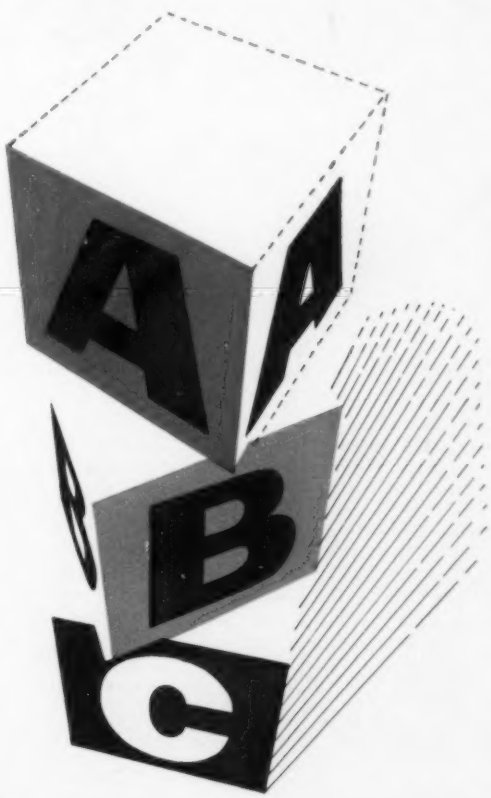

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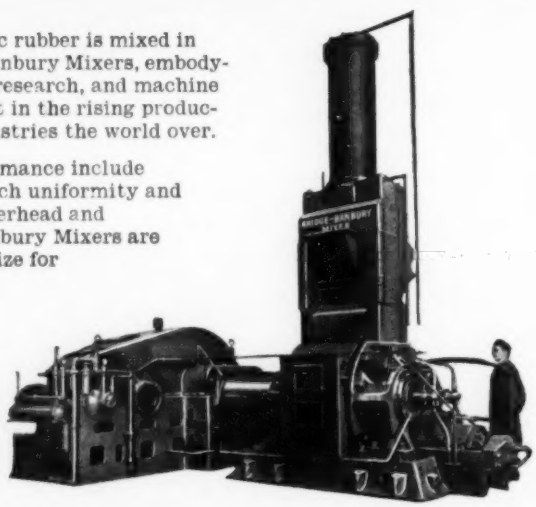

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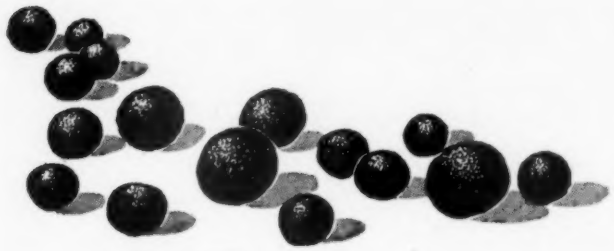

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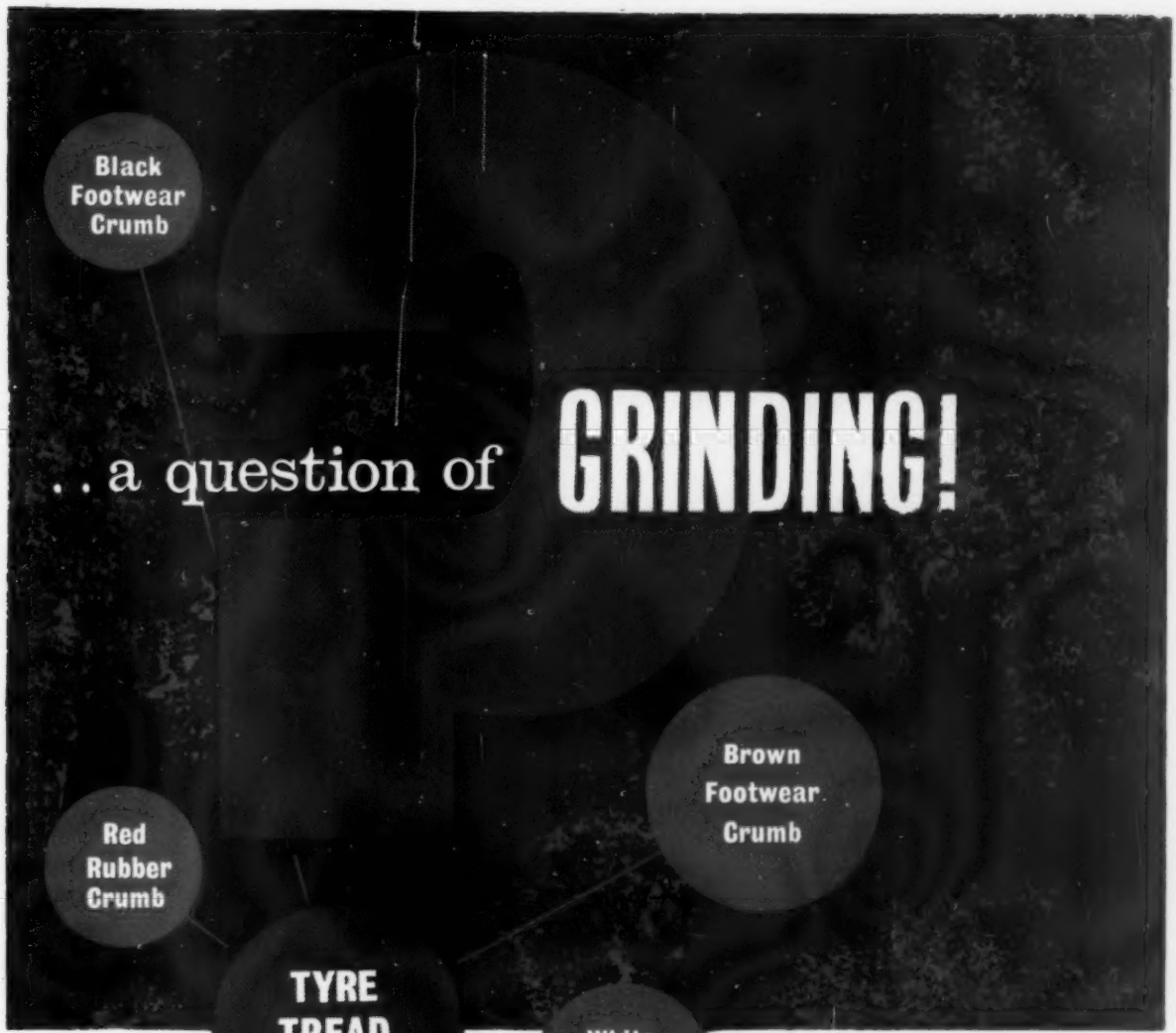

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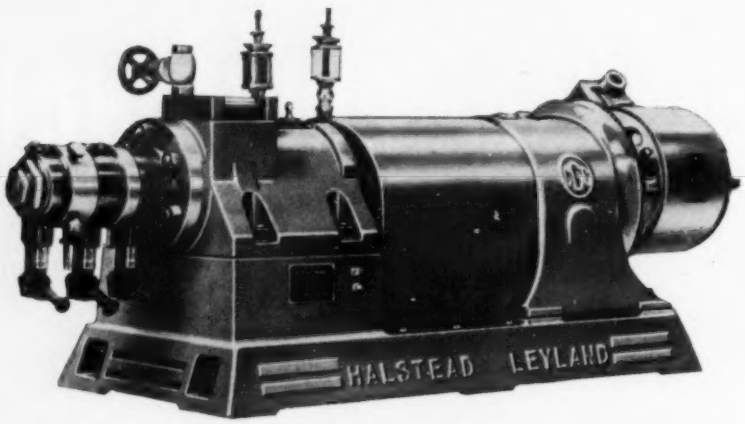

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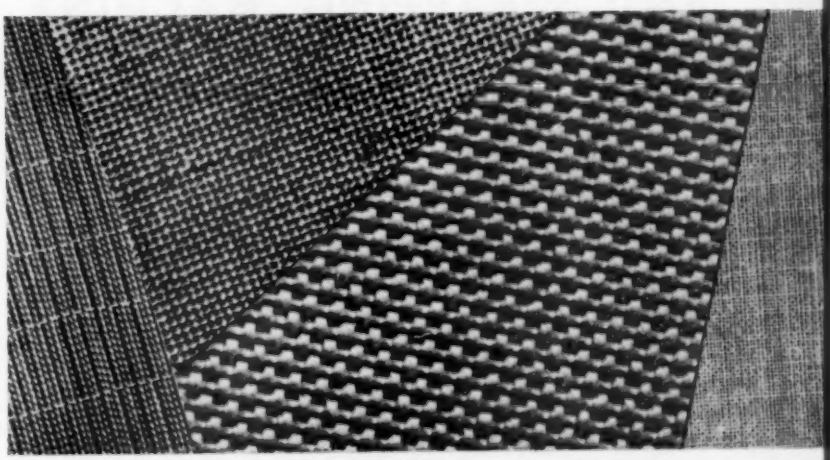

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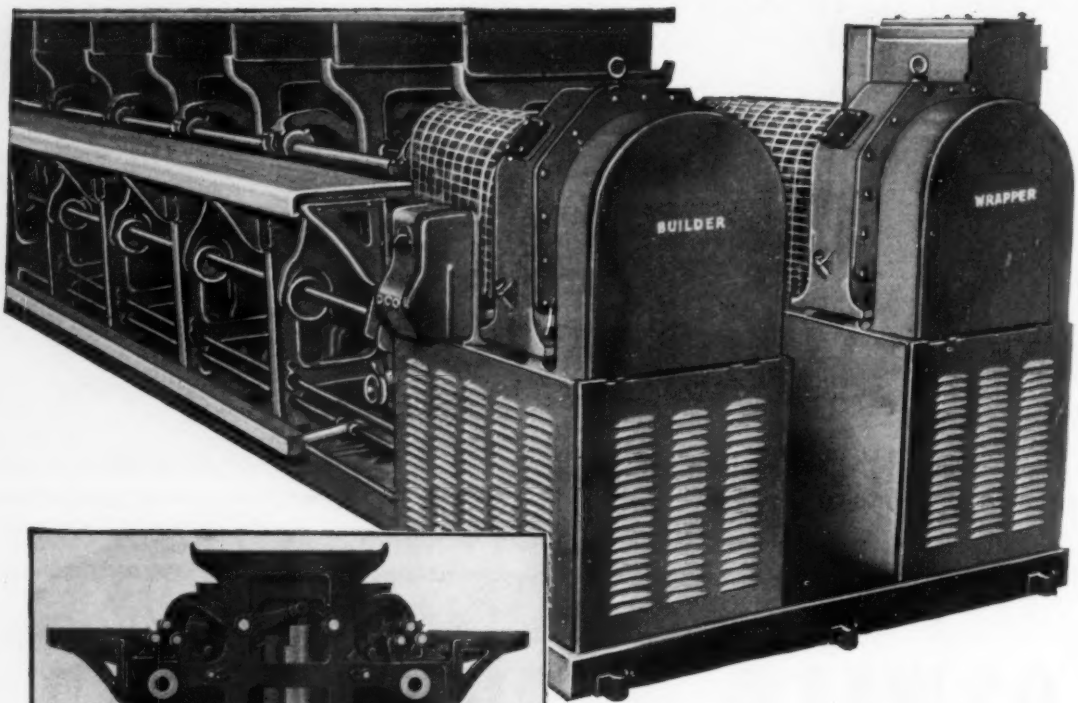

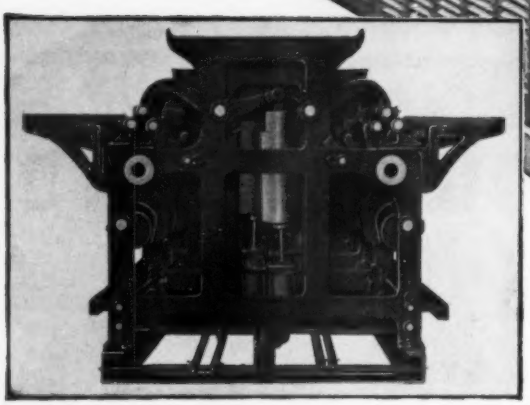

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IN ITS 76th YEAR

January 30 1960

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NOTES of the WEEK

European Tunnel

WITH Europe at sixes and sevens, plans currently being discussed for the Channel Tunnel are perhaps of even greater interest than before. As Sir Brian Robertson, chairman of the British Transport Commission, told a meeting in London last week, 'A tunnel would, indeed, make Great Britain a part of the Continent of Europe.' Sir Brian Robertson was, of course, considering the Channel Tunnel as part of a transport communications network. He envisaged passenger trains from London to Paris in about four hours. 'But,' he declared, 'it would be wrong to envisage the tunnel purely as an Anglo-French conception. If it came into being it might well involve a major reorientation of railway traffic routing in Western Europe. Major reorientations were also the subject of discussion at Strasbourg on the same day last week when the debate on European economic relations in the Consultative Assembly of the Council of Europe tended, according to *The Times* correspondent, to take the form of refighting the battle of the Six and the Seven. The chief point at issue was whether or not the concept of a wider Europe implicit in the original idea of a European free trade area was still valid. Mr. Costello, of Ireland, recalled that the kernel of the basic problem of economic relations in Europe was the continued disagreements between France and Britain. If these could be settled, large-scale cooperation would become possible. In another strong plea for agreement an Austrian thought that if France had been necessary to European unification in 1958, Britain was necessary in 1960. The Channel Tunnel will be an excellent example of Anglo-French cooperation. It is to be hoped that we do not have to wait for its completion for a further example.

Idle in Alehouses

THE 50th anniversary of the opening of the National Labour Exchanges in Great Britain occurs next Monday. They were established in 1910 and were introduced into Parliament by Sir Winston Churchill, then President of the Board of Trade. Originally the scheme provided for 250 Exchanges. Today there are over 900. It is not without interest to note that three Exchanges, Aberdeen, Dewsbury and Tottenham, still occupy the original premises. The principle of controlling and transferring labour was not new. For many years before the Labour Exchanges Bill was brought before Parliament there had been efforts to maintain registers of people applying for work. Most of these were bureaux organized and run under voluntary management, and later under local committees set up by Act of Parliament. One of the earliest recorded experiments in the organization of labour was in 1547 at Coventry, where aldermen were instructed to enquire among their neighbours and 'transfer workmen from one master to another as needs require.' Tradesmen, such as carpenters and masons, were instructed to attend the Broadgate at 5 a.m. on a summer morning ready for work and 'attend such as lacked workmen.' None was to be found 'idle at home' or 'in any alehouse on pain of imprisonment.' The magnitude of the tasks which sometimes have faced the Exchanges can be judged by the fact that within six months of the end of the first world war, for instance, the number of unemployed rose from 73,000 to well over one million. By mid-1920, more than two million were registered as workless with another million on short time. The threat of another war helped later unemployment difficulties when, in 1938, 2,700,000 vacancies were filled. When Sir Winston Churchill visited some Exchanges in 1910 on their first day of operation, he described them as a piece of social mechanism, absolutely essential to any well-ordered community. They are certainly now an accepted part of the national life. In the last half-century they have filled more than 100,000,000 jobs. In their first year the total was 400,000, last year they placed nearly 1,900,000.

Polymarsthene

THE Russians are reportedly already thinking in terms of manned outposts on Mars, an achievement said to be possible within the next ten years. Even writers of science fiction do not pretend to know with any accuracy what the first men on Mars will find there. We can, however, hazard a guess. They will find plastics. As is fairly widely agreed, Mars is in a more or less permanent state of drought. In fact, and to digress, such is the scarcity of this essential commodity that any inhabitants probably work on a water rather than a gold standard. We know, even on backward Earth, that polythene film is immensely valuable as a horticultural aid. Placed in long rows over growing plants, it protects them from strong winds — and much of Mars is said to be swept by perpetual sandstorms; it raises the environmental temperature — Mars is some 35m. miles further from the sun than we are, with a night temperature averaging 0°C. and a day temperature of 21°C., and plants under polythene require less irrigation because moisture collects on the inner surface of the film during the day and is dropped on the ground at night. The conclusion is obvious. Those canals, or channels, which have troubled observers for so many years, are no more than miles-long stretches of 'polymarsthene' film. This remarkable material is doing the essential job of conserving the planet's precarious water supply — melting snow and ice from the poles — by stopping evaporation.

NEWS *Briefs*

US CREDIT FINANCES INDIAN TYRE PLANT
DUTCH SBR LATEX PROJECT — DANISH CABLE
UK AT LEIPZIG FAIR — JAPANESE POLYTHENE

●**United States** — The US Export-Import Bank announces that it has approved a credit of 22.5 million Indian rupees to the Goodyear Tyre and Rubber Co. of India, to help build and finance a tyre factory at New Delhi. The new factory will employ 900 people. The Bank said this was its largest ever foreign currency transaction.

●**New Zealand** — Malaya and New Zealand will soon start trade talks with a view to signing a trade agreement, the Malayan Prime Minister, Tunku Abdul Rahman, said in Wellington. Talks should start soon after Malaya concludes trade talks with Japan next month, he said.

●**United States**—Facilities to produce more than 10 million lb. per year of epoxides have been completed at the West Virginia plant of Union Carbide Corporation. Production is to increase gradually over the next few months.

●**Denmark** — The Danish Great Northern Telegraph Company has announced plans for a submarine telephone cable from Iceland to Newfoundland, to be laid by a German firm.

●**United Kingdom** — Roto-Finish Ltd., Hemel Hempstead, finishing processors for the metal and plastic industries, have acquired a substantial interest in N. V. Roto-Finish Maatschappij, Rotterdamseweg 370a, Delft, Holland, which is engaged in similar business in the Benelux countries. Combined sales areas will include the UK, Benelux and other countries.

●**United States** — The Seiberling Rubber Company has announced it will establish a new plant in Arkansas as part of its current expansion programme. Initially the plant will turn out additional shoe products and other rubber goods now being produced to capacity in Seiberling's plants in Barberton and Carey, Ohio. The new project, costing $1,300m. will probably be built in Batesville, about 100 miles north of Little Rock.

●**Hong Kong**—The US Department of Commerce's Bureau of Foreign Commerce has announced that about 160 commodities may now be exported to Hong Kong and Macao under general licence GHK. Included are certain rubber and rubber manufactures, such as piece goods of synthetic rubber, soles and soling, medical rubber articles, farm tractor and implement tyres, belts and belting, and hose and tubing.

●**United Kingdom** — The International Synthetic Rubber Co. Ltd. have started to expand the annual capacity of their Southampton plant to 90,000 tons from 70,000 tons. This follows closely on the commencement of construction of a plant for the production of 2.5 million gallons a year of latex.

●**United States**—The Jefferson Lake Sulphur Company of New Orleans has acquired a major deposit of chrysotile asbestos near Stockton, California, and will enter the asbestos-products field, it is reported in *Foreign Trade*. Some 15 million tons of commercial asbestos ore have been proved, and the company plans to erect a mill with a daily rated capacity of 2,000 tons of ore.

●**Holland**—A new SBR latex plant is to be built in Rotterdam. The plant will be operated by Dow Chemical's wholly-owned Dutch subsidiary, Nederlandsche Dow Maatschappij N.V., and investments in the new installation total over 7½ million Dutch guilders. Completion of plant is scheduled for early Spring 1961; initial annual capacity is expected to be large enough to cover the increasing SBR latex requirements of Western Europe.

●**United Kingdom** — Albright and Wilson and A. Boake Roberts and Co. (Holdings), have reached agreement with a view to a merger. Both firms' shares rose rapidly when the news broke. If the agreement goes through, a group will be created with a market capitalization of about £45m.

●**Japan**—The Polyethylene Products Association has estimated that delivery of agricultural purpose polythene film will reach 70 million sq. metres for the year ending March 1960. This would be some 10 million sq. metres more than the previous year.

●**United Kingdom**—Record production of man-made fibres was achieved in 1959, 22% more than 1958 and 4% more than 1957, the previous peak year. Output of man-made fibres in December 1959 was the highest recorded for any one month. Total for 1959 of continuous filament yarn and staple fibre (both on delivered weight basis) was 514,700,000lb.

●**Japan** — Sumitomo Bakelite Co. Ltd., Tokyo, has decided to participate in the management of Kito Chemical Industry Co. Ltd., in which it holds 70% of total stocks. The latter company processes various plastics goods, mainly PVC.

●**Australia**—Marley Tile (Holding) has made an offer of 25s. (Australian) per 5s. (A) share for up to 70% of the £A79,125 ordinary share capital of Reliance Industries (Australia). Representatives of both companies have agreed to meet in England during March to finalize negotiations.

●**East Germany**—The East German Chamber of Foreign Trade announces that British Overseas Fairs is this year to have a collective exhibit at the Leipzig Spring Fair for the first time. Some of Britain's largest concerns will be represented in the exhibit, including I.C.I. Dates of the fair are February 28 to March 8.

'I ask yer — do I look like the sort of bloke who'd fiddle the batch cards?'
— 469

Record US Rubber Consumption

CONSUMPTION of new rubber in the USA during 1959 was the highest on record, amounting to 1,628,013 long tons, according to the Rubber Manufacturers' Association. This compares with the previous record of 1,529,699 long tons used in 1955 and the 1958 consumption of 1,364,404 long tons.

Consumption of all kinds of synthetic rubber at 1,072,729 long tons set a new high record compared with the previous highest of 925,879 long tons in 1957. Natural rubber consumption totalled 555,254 long tons in 1959 compared with 484,492 long tons in 1958.

Of the total new rubber consumed in 1959 synthetic rubber amounted to 65.89%. The Association points out that this exceeds the 1958 ratio of 64.49%.

Furniture Exhibition

Furniture for the 1960s is on show at the Furniture Exhibition, Earls Court, London, which opened on January 25 and continues until February 6.

A feature of the stand of the Dunlopillo Division of the Dunlop Rubber Co. is a 9ft. by 6ft. model house. This eight-room miniature house features upholstery, mattresses, cushions, pillows, bolsters, carpet cushioning and stair pads by Dunlopillo, in addition to Vynolay flexible floor covering in kitchen, bathroom and dining recess.

Moscow Symposium

The International Symposium on Macromolecular Chemistry, to be held in Moscow from June 14-18 this year, will contain both plenary sessions and meetings of these three sections: Synthesis of Polymers; Polymerization and Polycondensation Reactions; Chemical Transformations in Polymer Chains.

The programme provides special time for discussions, and for the establishing of contacts between individual members. The meetings are to be held at the Moscow Lomonosov State University (Leninskie Gory, Moskva).

Enquiries should be addressed to the Organizing Committee of the Symposium on Macromolecular Chemistry, Pervni Akademicheskii Pr.D.18, Moskva, V-312, USSR.

Mr J. K. Money has been appointed a director of Brooklands Selangor Rubber Company.

BLACK DEAL

The Columbian Carbon Company has arranged with the Continental Carbon Company to co-ordinate manufacturing facilities of their two major plants in Europe.

As part of the programme, Columbian purchased an interest in Continental's new 25,000,000lb. carbon black plant in Rotterdam. This will be operated as Continental-Columbian Carbon (Nederland) NV. Production is scheduled for early this year. At the same time, Continental Carbon has purchased an interest in the new 60,000,000lb. carbon black plant being built by the Columbian Carbon at Trecate, near Milan. This plant will be operated as Columbian Continental Europe SpA, and will be completed in the autumn of this year.

International marketing of the production of both plants will be handled by Columbian Carbon International, Milan, for Columbian Carbon Company and Witco Chemical Co. Ltd., London, for Continental Carbon Company.

Union Carbide Ltd. have announced the appointment of Mr H. Cawley as Sheffield Area Sales Manager, with his office located at Grange Mill Lane, Wincobank, Sheffield.

Microcell announces that its commercial engineering division has been formed into a subsidiary company known as Microcell Engineering.

ISO Conference

SUCCESSFUL MEETING IN NEW YORK

FIFTY-NINE delegates from 10 countries attended the International Standards Conference in New York, at which Mr J. M. Buist, UK, was chairman. The leaders of the delegations were Mr W. H. Watson, Canada; Mr de Chauveron, France; Mr R. Ecker, Germany; Dr Zerbini, Italy; Mr Jamnadas, India; Dr H. Geldof, Netherlands; Mr E. Ganslandt, Sweden; Dr J. R. Scott, UK; Dr R. D. Stiehler, USA; and Mr A. S. Nivikov, USSR. In addition to Mr Buist and Dr Scott, the UK delegation consisted of Mr H. C. Baker, Mr F. H. Edwards, Mr B. J. A. Martin, Mr J. L. Newnham, Mr F. C. J. Poulton, Dr W. C. Wake and Mr H. T. Lawrence.

Mr S. Collier, Chairman of Committee D11, took the chair at the banquet and paid tribute to the skill and impartiality which had been exercised by Mr Buist at the technical sessions.

The New York meeting of the technical conference on rubber was a most successful one and we intend to publish a report on the conference written by Mr J. M. Buist, in the near future.

At the banquet (left to right): Admiral Hussey, ASA; Mr Schoenfeld, B. F. Goodrich Co.; Mr S. Collier; Mr J. M. Buist, I.C.I.; Mr R. Ormsby, RMA; Mr R. E. Hess, ASTM

The Import Licensing Branch has been transferred to the Board of Trade, Tariff and Import Policy Division, Horse Guards Avenue, London, S.W.1. Tel.: Trafalgar 8855.

International Rubber Conference

PART 2. AGEING — TESTING — PRODUCTION

DETERIORATING influences on rubber was the subject of an interesting set of papers given at the International Rubber Conference in Washington. The first, by Thorley and Watts, of I.C.I. Ltd., was called 'Behaviour of Selected Derivatives of *p*-Phenylenediamine in Rubber Compounds.' This described how the anti-ozonant and anti-flex cracking properties of a whole group of *p*-phenylenediamine derivatives had been studied over a wide range of test conditions. Excellently presented, the paper gave an insight into the careful and lengthy trials which must precede the successful marketing of a new commercial antioxidant.

The main merit of the paper by G. F. Bush on 'New Artificial Weathering Methods,' was the provision in the printed version of a bibliography of 77 useful references.

'After World War II it soon became apparent that cracking due to ozone attack was taking an unusual toll on elastomeric products. The reason for this sudden serious appearance would make many pages of interesting study and comments on the physical and psychological theories involved.' This is how Lowman and Miller, of Goodyear and Cadillac respectively, opened their paper on 'Natural and Accelerated Ozone Ageing of Elastomer Compounds.'

Rubber compounds which were satisfactory some years ago were now found to crack in a short time. This effect was presumably due to the fact that there were more motor-cars on the roads—oxides of nitrogen in the presence of hydro-carbons could give rise to ozone. Dirt, grit, and minute particles containing copper and manganese[1] could also have an effect.

The authors studied the time which elapsed between mixing and extrusion, and also between mixing and moulding, but without effect. The method of cure, however, was found to have an effect, open steam giving the worst, and compression moulding the best, result. This means that compounds cured by different methods should not be directly compared. The authors used the ASTM D11-71 test specimen. Here a test piece ½in. thick was wrapped round a 2in. mandrel.

If a staple or tack was used to fix the test piece, cracking occurred at this point. Increasing test temperature increased the severity of the attack. At any one situation there was a direct ratio between temperature and cracking. In the authors' paper, tables showed the results of exposure tests at 17 different places. Chicago gave the most severe cracking and at many places, including Mare Island, California, there was no cracking at all with a compound based on SBR. With natural rubber, cracking was generally greater, but it was particularly interesting that Mare Island gave the worst cracking, while at Chicago natural rubber behaved extremely well! At Litchfield Park in Arizona, there were no cracks on the natural rubber and bad cracks on SBR. All this showed that the relative merits of natural rubber and SBR depend entirely on the place where exposure takes place.

The authors dealt very clearly and effectively with artificial testing, and in particular with the factors which had led to variable results between different laboratories. For example, the rate of flow of air through the test chamber, the nature of the mandrel, and the mode of fixing the specimen all had to be carefully considered and standardized. When all the necessary precautions had been taken the 'crack rate' results between different laboratories agreed well.

The original paper is worth studying by anyone interested in the subject of ozone cracking and the effect of exposure generally, for it seems that the troubles are not confined to the rubber industry, but are encountered also with plastic parts—particularly those from PVC which are used in car construction.

Latex

One of the most interesting features of the conference was that, far from being overshadowed by developments in synthetics, natural rubber produced a series of papers on recent work which were of absorbing interest. The first of these 'Preservation of Natural Field Latex,' by J. S. Lowe, Dunlop Malayan Estates Ltd., was read by Mr Newnham. He opened the proceedings by showing on the screen some excellent colour slides of the collection of latex in Malaya.

More than half of the ammonia issued on the estates for the preservation of latex was lost, he said. The latex when analysed was found to contain 0.06% instead of 0.02% as calculated, and if there was less than 0.05%, bacterial growth was encouraged. 0.1% was really necessary to discourage bacterial growth and as much as 0.5% to give true bactericidal action.

A further point was that the new high yielding clones gave much more latex than previously.

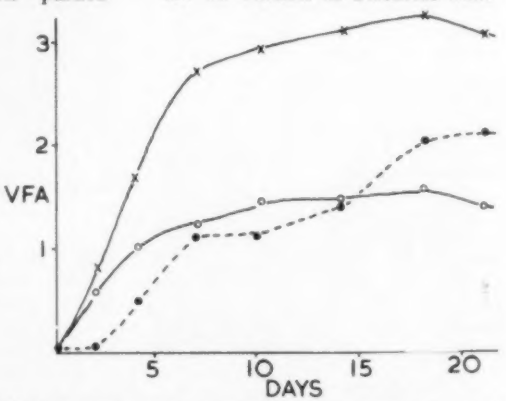
One question was: at which stage should the ammonia be added? To the buckets or to the tanks at a later stage? As a result of the study which had been carried out, field ammoniation had now been suspended on many estates.

The yield of latex varied and this affected the number of bacteria per c.c.: as the age of the tree increases, so does the bacterial infection. Contamination depended on the length of the cut, that is, the yield per length of cut. The volatile fatty acid content was a useful measure of the quality of preservation. New or uncut bark had a high starch content so that the volatile fatty acid content was high. (See Fig.)

Sodium pentachlorphenate was added only to the concentrated latex because of the danger otherwise of polluting streams and killing fish.

Rubber Production

Dr G. Verhaar of Firestone Plan-



Volatile fatty acid formation in different types of latex. (Fig. 2, p. 270 of proceedings).
—— x —— **Slaughter tapped trees**
—— o —— **Newly opened trees**
- - - ● - - - **Intensively tapped trees**

[1]Winkelmann, *Ind. Eng. Chem.*, **44**, 84, 1952.

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High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

tations Co., in his paper 'Modern Large Scale Production of Hevea Rubber,' described the operations of the Firestone plantations in Liberia where the annual production is now 82 million lb. First quality crepe was produced there by blending field latex in 8,000 gallon lots, coagulating in 175-gallon skids, milling and drying at 110°C. Sodium sulphite was used in all latex. The rubber produced from ammoniated centrifuged skim was chemically purified.

In the subsequent discussion, J. E. Morris said that such a process would not pay in Malaya, where the price obtained for the normal (untreated) skim is better than that for skim subjected to trysin digestion or other treatment.

J. E. Morris read the next paper, which was prepared together with Mr B. C. Sekhar of the Rubber Research Institute of Malaya, and was called 'Recent Developments in the Production and Processing of Natural Rubber in Malaya.' One item the authors dealt with was that, at room temperatures, oxygen in the latex gave hydroperoxidation, so that when the latex was mixed in equal amounts with a monomer such as vinyl acetate, together with a polyamine and a ferrous salt, a copolymer was obtained. All latices contained a reduction activator which is an amine. Crystallization of rubber could be retarded by upsetting the symmetry; for example, by adding thiobenzoic acid to the latex or by adding formalin to field latex. The printed paper also describes the use of ZDC and boric acid as preservatives for latex.

Most regrettable was the authors' statement that, in respect of air dried sheet, if shipment was delayed or storage prolonged, paranitrophenol must be used to prevent mould formation. The use of this substance has caused untold damage and led to at least one law suit, so that it would be hoped that those in charge of rubber production in Malaya would, far from continuing to recommend its use, advise strongly that it should no longer be employed.

Testing of Rubber

Current trends in standardization of natural rubber were described by Maurice Liponski, Jean d'Auzac and Vu-Dinh-Do. The zinc oxide stability testing of natural and synthetic latices was dealt with in a paper by D. J. Simcox and J. L. M. Newnham of the Dunlop Rubber Co. Ltd., the paper being read by the latter. The mechanical stability was determined on latex with a total solids of 55% and at a temperature of 33°C.—this was near to the temperature at which foamed rubber is manufactured and is one which is attainable in the tropics. Soap was added since this is usual in technical processes.

The latex was shipped at a *p*H of 9.5-10.5, and in the test the *p*H must be controlled. The zinc oxide itself can alter the *p*H. A *p*H of 9.75 was chosen, for this is near to the *p*H at which zinc oxide is added in foam manufacture, and is on the more constant part of the curve. Dry zinc oxide was used and gave better results than with dispersions. Analytical results were more consistent between various laboratories.

Growth Stimulants

The inimitable Dr J. Le Bras of the Institut Français du Caoutchouc entertained his audience by describing the phenomenal results of growth stimulation in his paper, 'Physiology Applied to the Improvement of Hevea Yield.' It was indeed a major step forward to find that, according to Dr Le Bras, the use of 2:4 dichlorophenoxy acetic acid (known as 2,4-D) increased the yield of latex by 25-40% and that after 12 years of experience it seems that this not only fails to have any harmful effect upon the rubber tree but actually seems to improve it. 'A veritable revolution has just begun in the methods of rubber growing,' said Dr Le Bras, 'and it must lead to economic consequences of the utmost importance.'

Mineral deficiencies have long been known to be responsible for poor growth and poor yield in agriculture in many parts of the world, but the effect of injecting traces of minerals into the trunks of the rubber tree with plastic tubes, as described in this paper, was likely, together with the use of growth stimulants, to lead to revolutionary results in the production of natural rubber. It seems that the tree contains more and better catalysts than have been invented by man.

UK Agent for Maxinec

Parnall and Sons Ltd., Lodge Causeway, Bristol, manufacturers of Parnavac vacuum forming machines, have been appointed sole UK agents for the well-known range of high frequency welding machines, produced by Maxinec NV of Schiedam, Holland. This appointment commences on February 1. Maxinec showed their range (including a new automatic high frequency welding and cutting plant, specifically produced for packaging of pharmaceutical products) at Kunststoffe 1959, where their products aroused considerable interest.

New Glass Fibre Plant

Glass fibre production began this month at the new £750,000 plant at Camberley, Surrey, of Glass Yarns and Deeside Fabrics Ltd., an associate company of Microcell Ltd. This will make Camberley one of the major glass fibre producing centres.

The plant will not only step up Britain's output of glass fibre now in great demand as a reinforcement material for the plastics industry; it will have one of the most extensively equipped research establishments in this particular field.

An artist's impression of the new £750,000 glass-fibre plant of Glass Yarns and Deeside Fabrics Ltd. at Camberley, Surrey

Chemical Grafting on Crystalline Surfaces*

IT is well known that for the majority of heterogeneous catalytic processes the physical state of the catalyst sometimes plays a greater part than does its chemical nature. Thus the degree of comminution of a solid catalyst frequently proves decisive. The most effective catalysts for a series of reactions, including reactions of catalytic polymerization, are fully dispersed solid crystalline substances, used in the nascent state, as a result of the presence of the exceptionally reactive surface of the crystal at the moment of its formation. If the dispersion of the crystal is carried out directly in a medium of monomer in the absence of atmospheric oxygen, then the initiation of polymerization may take place on the exposed crystal surface. One of the present authors, in collaboration with Kabanov and Zubov[1], demonstrated that it is possible to produce exceptionally active initiators of polymerization by dispersion of a series of crystalline substances by the molecular beam method. Nevertheless, to obtain polymerizing surfaces it is not necessary to disperse the crystals to molecular dimensions, as in the work mentioned. Any process of mechanical fragmentation of macrocrystals can bring about polymerization of a monomer under the appropriate conditions.

We were successful in effecting such processes of initiation of polymerization and grafting of a polymer on crystalline surfaces of inorganic substances by fragmentation of crystals of quartz and of cooking salt in a medium of styrene and methyl methacrylate by vibro-milling, which is one of the most effective methods of fine comminution of solid substances. After milling in the vibro-mill for 30 min. the suspension of monomer and quartz was converted into a polymer-monomer mass, containing dispersed quartz. From the reaction medium we were able to separate the polymers dissolved in the corresponding solvents, containing mainly insignificant amounts of chemically bound SiO_2 and undissolved graft copolymers of quartz with styrene and of quartz with methyl methacrylate, enriched with SiO_2. In these cases the initiation of polymerization is effected, apparently, by the exposure of the crystalline lattice of the quartz and of NaCl during their splitting up, and by the brief existence on the planes of fracture, of free radicals or ions, capable of reacting with the molecules of monomer surrounding the crystal. The concentration of active particles in a continuous process of fragmentation of crystals of this kind is apparently sufficiently high.

It is interesting to observe that pure graphite subjected to vibro-milling is capable when mixed with styrene or methyl acrylate of bringing about almost instantaneous polymerization of these monomers at room temperature in the absence of atmospheric oxygen. The initiation of polymerization in this case is effected, obviously, through the free radicals on the surface, by the splitting up of the lattice of graphite.

At the present time we are carrying out in our laboratory a detailed investigation of processes of mechanochemical grafting of polymer on solid surfaces and of the properties of the resulting graft polymers.

REFERENCE

[1]V. A. Kargin, V. A. Kabanov and V. P. Zubov, *Vysokomol. Soed.*, 1959, **1**, No. 2, 265.

*By *V. A. Kargin and N. A. Plate* (Vysokomol. Soed., 1959, **1**, *No.* 2, 330-1). *From Translation No. 778 by the Research Association of British Rubber Manufacturers.*

MERCK MAGNESIUM

New Distributors

Increased adoption of synthetic rubber in European industry has prompted the Merck Marine Magnesium Division, Rahway, New Jersey, to expand international distribution of their products there. More distributors have been appointed in six European countries, it was announced by William H. Crom, market development manager.

Merck Marine Magnesium products —'Maglite' D, M, L, K, and Y forms of reactive magnesium oxide; 'Marinco' O, magnesium oxide USP and Tech., and 'Hydro-Magma,' a paste of magnesium hydroxide in water—will be available through the following firms: Atlantic Trading Co., Brussels; O/Y Uko A/B, Helsinki; SECCA, Paris; Nordmann, Rassmann and Co., Hamburg; Bubeck and Dolder, Basle; and Croxton and Garry Ltd., Kingston-on-Thames, Surrey. Croxton and Garry inform *RJIP* that stocks of Merck's products are now being built up in many parts of the UK, so that deliveries can be made at short notice.

Fireproof Plastics!

Although the fire at the Saro Products factory at Cowes in the Isle of Wight last week severely damaged the general products part of the plant, the plastics plant was completely unaffected and production is continuing. In fact, the company says that production of thermoplastics sheet is increasing, owing to the provision of additional new plant.

A new swing door by Mancuna Ltd., of Denton, Manchester, is suitable for pedestrian and light trolley traffic. This timber-framed 'Manby' door has resin laminate rubber panels which give flexibility, and yet sufficient rigidity to prevent distortion. It also makes for lightness — as can be seen from the girl demonstrating finger-tip control. The windows are of clear Perspex, giving good 'see-through' vision, and the doors are available in a wide range of colours, including opaline green, peacock blue, salmon pink, red orange and yellow

Plastics at Work

1960 A BIG YEAR IN PLASTICS

By DAVID ALEXANDER

WITH the commercial availability of new materials and with the development of plant to handle these materials it is only to be expected that changes and developments will take place in 1960 within the plastics industry. Another factor to be taken into account is the increasing technological knowledge among users of plastics.

High Impact PVC

As is known there was a great deal of publicity in 1959 on the subject of a PVC which had an impact strength of up to fifteen times that of ordinary PVC and which was apparently going to provide the answer to many of the limitations that at that time existed for the use of PVC. However, after the initial wave of publicity and technical reports had passed, it slowly became apparent that the practical commercial use of high impact PVC was not likely to be anything like what was originally anticipated. One point which particularly in time influenced users was the severe temperature limitations of this material and another was the fact that the impact strength drops after a few years, although no information is available as to just when this stops.

There is no doubt, however, that although high impact PVC has a great part to play in many applications, it may be that perhaps in 1960 high impact PVC will take a more limited and less spectacular place in plastics engineering.

It looks as if the big development in 1960 in PVC will be for a low stabilized unplasticized non-toxic rigid PVC for use in the gas industry and for use with drinking water services. Already the big extruding companies are preparing for commercial production on a large scale of this type of PVC and from commercial comment available it would seem that these preparations are very much justified. In the gas industry, for instance, Chemidus Plastics Ltd. have already undertaken a very great deal of experimental work with the South Eastern Gas Board for the use of this type of PVC for the conveyance of gas. These tests have already proceeded beyond the laboratory stage and it is known that the South Eastern Gas Board has already ordered 100,000ft. of inch diameter PVC pipe for large-scale field trials. Although Chemidus on the manufacturing side and the South Eastern Gas Board on the user side were the prime movers in this development, it is already the case that other gas boards and other extruding companies are arranging for similar trials in order to develop eventually the commercial use of this type of PVC in the gas industry.

Similar negotiations are under way for the use of rigid PVC for the conveyance of drinking water, particularly as in certain applications polythene is not the most satisfactory material.

Polythene

The polythene tubing industry is probably the most competitive of all branches of plastic tube extrusion in the UK. Last year there was an increase of 50% in the use of ordinary polythene tubing to BS 1972 and it is anticipated that in 1960 at least a further 50% increase will take place in the use of this specification of polythene tubing. The main application has been in the farming communities and agricultural districts where water conveyance is a continuous problem. To some extent the big increase in sales last year must be attributed to the dry summer, but in spite of this the trend among these communities to install plastic piping is likely to grow. This increasing use may be attributed partly to the fact that plastics producers have concentrated their efforts on this section of industry particularly at agricultural shows which until recently did not devote much of their space to these materials.

Apart from ordinary polythene there is an increasing development in the use of high density polythene for similar purposes and for the conveyance of water services by local water boards, to some extent in competition with suppliers of rigid PVC tubing. Individual water boards, sometimes due to local conditions and preferences, do not always use the same materials.

Polypropylene

Polypropylene is as yet in its infancy in the UK, particularly with regard to extrusion where very little has as yet been done. But great interest is being shown by all extruding companies in this material as, if successful, there will be a very wide application for it for use in hot water services apart from any business it may take from the present market for plastic tubing. Already there is a switch-over from ordinary and HD polythene to polypropylene for injection moulding purposes in many instances and this trend is likely to develop considerably in 1960. The possible market for moulded articles such as small tanks and containers is very great as this is the only material that can be safely considered for handling liquids above boiling point. At the same time polycarbonates are beginning to appear in small quantities in England and although nothing great has been done commercially, 1960 may well be the development period as 1959 was for polypropylene.

Machinery

With the development of these new materials and the new markets for plastics the need for new machines even now and certainly in the future will be much greater than could have been anticipated one year to eighteen months ago. The problem is not only that of new materials and markets in the UK. The development of the Outer Seven, the EFTA must lead to a revision of anticipated outputs required. And if, from an even more long-term point of view, the Outer Seven reach a trading agreement with the EEC then again these output figures must be revised. In such circumstances, even without the latter mentioned developments, it is no longer really commercially practicable to think in terms of 50lb. an hour out of an extruding machine and therefore both extruder manufacturers and extruding companies must revise their planning and production accordingly.

Already it would seem that this is beginning to take place, certainly with the extruding companies where the more far-sighted organizations are already beginning to equip for double the production per machine. It may be that at the moment the extruder manufacturers in the UK have not developed plants of sufficient output to supply the extruding companies who were originally their customers. Reports show that a number of Continental extruder

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manufacturers are considerably developing their sales in the UK and to a great extent this is due to the apparent lack of equivalent output machinery in Britain for extrusion purposes. It is believed that this lag is being rectified by some manufacturers here in Britain. If, for example, company A is only producing 50lb. an hour of 2in. diameter ¼in. wall PVC tubing and company B is producing, say, 130lb. an hour of an identical tubing then the end cost and in the long run the bigger sales will come to company B. This would be entirely due to long-term planning arrangements.

For a long time also there has been a considerable resistance in many extruding companies in Britain to the use of twin screw extruders and although one British company has done very well in this field, R. H. Windsors Ltd., there is still this original sentiment against twin screw extruders which although technically justified some years ago is certainly not justified today.

In the field of injection moulding the situation, however, is not as reactionary as in extrusion. Both in the development of machinery and in production much excellent quality work with high outputs is already being achieved. The trend within certain sections of this field is undoubtedly towards the use of fast cycling injection moulding plant and it would seem that a considerable further development in the use of this machinery will take place in 1960. Considerable development has taken place in the design of this machinery to handle unplasticized PVC and polypropylene yet allowing sufficient flexibility in the machinery to permit its use for all normal materials.

Prices

In the last year there have been considerable reductions in prices of practically all grades of PVCs, polystyrenes and more recently in polythenes, all of which will help in the expansion of this industry. Again, many other industries are looking more towards plastics as possible materials for their purpose. Recently a report was given in *RJIP* (December 12 and 19) on the Building Exhibition from which it was quite clear that this industry will in the future use many more materials and products made from plastics than at present. Already this has started and with the reduction in prices it is certain that this development will grow greatly. The motor car industry is increasingly using plastics and in engineering and chemical industries again the attitude to these materials is much more favourable. This seems to have been particularly the case in the last year when plastic materials became no longer considered as a last resort but were frequently particularly specified for such purposes as fume extraction plant, including ducting, fans, tank linings and scrubbing units. The future application for these materials in this industry must be very great when one bears in mind that approximately £500,000,000 a year is lost entirely due to corrosion.

During 1960, under the heading 'Plastics at Work,' all plant products and plastics engineering developments which are thought to contribute from time to time to this big year in the plastics industry—1960 will be examined and reported on.

Linings in Uranium Plant

Rapid deterioration of previous tank lining materials has led operators of uranium reduction plants in South Africa to adopt neoprene. Neoprene-lined tanks are located at the President Steyn Gold Mining Co. Ltd., and the Welkom Gold Mining Co. Ltd. The tanks are 8ft. high, and 50ft. in diameter and are used to clarify the pregnant solution from the solids, consisting mainly of siliceous matter. The pregnant solution then goes directly to the ion exchange columns from which the uranium oxide U-238 is extracted.

To make the lining $\frac{3}{16}$in. thick sheet of Du Pont's neoprene is bonded to $\frac{1}{32}$in. thick natural rubber. These are precured. The natural rubber backing is then coated with cement and covered with glazed linen. After the precured lining material is transported to the tank sites, the linen is stripped off exposing the cement-coated backing. The cement-coated backing is then fixed to the tank.

Mr H. H. J. Swift has been appointed a director of Rini (Malaya) Rubber Estates.

COURTAULDS AND TRANSPORT

An exhibition demonstrating the substantial contribution made to the transport industry by Courtaulds Ltd., and its subsidiary companies, was held on the first three days of this week. It was staged in the whole 10,000ft. sq. area of the Celanese House showrooms in London.

The total number of different exhibits ran well into four figures, and covered a wide variety of different types of products. Most of these contained man-made fibres from Courtaulds Ltd. and British Celanese Ltd., but chemicals, plastics and paints in transport uses were well represented.

Exhibited also was Tyrex, the filament yarn developed specifically for the construction of tyre carcases.

Lubrathene, a multi-ply thermoplastic sheet developed for use as a separating membrane in concrete laying was also exhibited.

Among other companies in the Courtaulds Group who exhibited were British Cellophane Ltd., and National Plastics Ltd.

Rubber Hall of Fame

Thomas Hancock, English manufacturer and inventor (1786-1865) was recently added to The University of Akron's international Rubber Science Hall of Fame. He is the sixth person to achieve this distinction.

Hancock's citation read, 'A manufacturer and inventor, who, because of the important part he played in the establishment of rubber manufacturing has justly been called the "Father of the Rubber Industry," who in the earliest days of the industry contributed machines and techniques required for the successful fabrication of rubber goods.'

Hancock joins Charles Goodyear (American, 1800-1860), C. Greville Williams (English, 1829-1910), Carl O. Weber (German, 1860-1905), Henri Bouasse (French, 1866-1953) and Evan I. Ostromislensky (Russian).

IRI MANCHESTER

Some of those present at the highly successful annual dinner and dance held by the Manchester Section of the IRI on January 15 (*RJIP* January 23), are shown on facing page (*left to right*)**: 1. Mr J. K. Elliot and Mrs Elliot, Mr J. M. Buist (chairman of the Manchester Section), Mrs Buist, Mr T. Clyde Hewlett. 2. Mrs Gill, Mr L. D. Gill (secretary of Manchester Section), Mrs Linton, Mr T. F. Linton. 3. Miss J. Roberts, Mr W. E. Stafford. 4. Mrs Leyland, Mr K. Leyland. 5. Mrs Bratby, Mr E. V. Bratby, Mr C. H. Birkett, Mr E. Morris, Mrs Morris. 6. Mrs R. S. Rushton, Mr J. H. Carrington, Mrs Carrington. 7. Mrs Cheetham, Mr E. Cheetham, Mr R. H. Craven, Mr H. Claber, Miss M. Lumley. 8. Mrs Stafford, Dr J. T. Watts, Mrs Watts, Mr R. L. Stafford. 9. Mr P. W. Clephan, Mrs Clephan, Mrs J. Clephan, Mr J. Clephan. 10. Mr E. Muff, Mr G. C. Swann, Mr A. Culver.** **(More pictures appear on page 170.)**

1

IRI Manchester

Annual Dinner and Dance

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Polymers of the Future

NEW COMBINATIONS OF QUALITIES

By PETER BALDWIN

OF the hundred odd known elements, non-metallic ones have the greatest tendency to form giant molecules, and of these carbon is pre-eminent. Polymers based on carbon occur in nature, as in starch and wool, and of course practically every plastic made today is based on carbon polymers. There are, however, other elements which can also form polymerized molecules and recent research has shown the great possibilities that lie in this direction. In particular, interest has grown in the potentialities of polymers based on boron, nitrogen, sulphur, silicon and phosporus. As a result, it is probable that in the foreseeable future new types of plastics will make their appearance which possess combinations of qualities unobtainable today—resistance to extremely high temperatures, great resistance to chemical attack and some very interesting electrical properties such as semi-conductivity, to mention just a few. An obvious application for such materials will be in guided missile and rocket development and high-speed engines of all types.

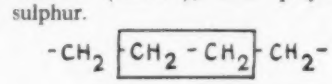
The units of polymer molecules are relatively small molecules, in shape either linear or ring like, called the monomers. To obtain a polymer with a certain set of required properties, both the length of the chains and the relationships between them have to be controlled.

As an example of how this requirement has to be met we can consider the spinning of nylon filaments. Nylon chips will not spin to usable filaments if the chain length, as measured by the molecular weight, is not within carefully controlled limits.

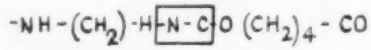
It follows that in order to produce a commercially viable new polymer, the two fundamental requirements are that the monomer molecules should be capable of forming strong, stable bonds between each other and that the size of the resulting chain or ring structure should be controllable.

There are two ways in which the monomer molecules can link up. The bond joining them can be either between similar or dissimilar atoms, as for example between two carbon atoms in polyethylene, or a carbon atom and a nitrogen atom in nylon.

In the case of carbon polymers both these types of bonds are very stable. Boron, nitrogen, phosphorus and sulphur do not generally form stable structures when the bond between the monomer units joins similar atoms: the bonds do, however, become strong and stable if they are between two dissimilar atoms, although exceptions do exist, such as phosphorbenzene $P_4(C_6H_5)_4$, a yellow solid melting at 150°C. (302°F.), and polymeric sulphur.



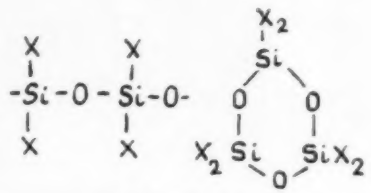
ethylene unit



Silicon polymers are a good illustration of how the strength of a bond varies according to whether it joins similar or dissimilar atoms. Silicon polymers containing silicon and hydrogen can be made by the cracking of silanes, the silicone equivalents of paraffins. Silicon chloride can also be 'cracked,' resulting in the formation of polymers, probably of the chain type. Both these compounds are based on silicon-silicon bonds, and are easily decomposed by heat or the action of chemicals. On the other hand if an oxygen atom is introduced between each silicon atom, the silicones are obtained. Chemically these are very similar to the silicates, one of the most common and stable of the constituents of natural rock. Silicones are already well known in industry as resins, additives to rubber, waxes, rubbers and varnishes, paints and surface coatings. We may note that in the case of the silicones, by introducing certain other chemical groups in the chains, the chain lengths have been effectively controlled, which enabled the silicone polymers to achieve their present excellent properties.

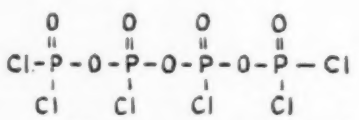
The silicone oxyhalides, also of the silicone family, are based on a molecule containing silicon, oxygen and chlorine or bromine. The polymer molecule is a long chain or a ring system. If the chlorine or bromine in these molecules is replaced by a group containing nitrogen, it is possible to promote further cross-linking between the chains or rings.

Structurally very similar are the phosphorus oxyhalides, the place of silicon being taken by phosphorus.



X = Cl or Br

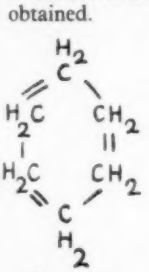
Silicon oxyhalides



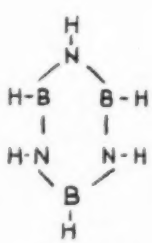
Phosphorus oxychloride

They also feature the reactive chlorine or bromine atoms, and thus offer scope for considerable further synthetic work. The fluorine derivative has only recently been prepared by the controlled polymerization of a compound obtained from the reaction between phosphorus trifluoride and oxygen passed through an electric discharge at low temperature.

Some of the most interesting of new polymers are based on nitrogen in conjunction with some other element. A polymer based on nitrogen and boron, called borazole, has a structure very similar to benzene and a number of similar derivatives can be obtained.



Benzene



Borazole

A current disadvantage of this system is that no convenient method has been found to control the additional polymerization or cross-linking of the boron-nitrogen rings or their derivatives. The nitrogen in this link can be replaced by phosphorus, when a surprisingly stable unit is obtained which is only attacked slowly by weak acids even at 300°C. The limiting boron-nitrogen polymer has a structure similar to graphite. Rings of

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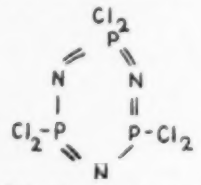
alternating boron and nitrogen atoms are stacked in layers, giving a hard, chemically inert solid.

Structures whose skeletons consist of nitrogen and phosphorus or nitrogen and sulphur atoms show probably the greatest practical potential. The best known of these polymers are the phosphonitriles. They are oils or rubbery solids, consisting of nitrogen, phosphorus and chlorine atoms. The simpler forms are rings of a somewhat similar constitution to benzene. A higher polymer, a plastic solid, has probably a chain structure.



Phosphonitrile ring

This polymer can be further cross-linked (vulcanized) by careful oxidation. If the simpler polymers are heated at 350°C. further polymerization occurs with a probable breakdown of the ring structure, and rubbers are obtained. The chemical resistance of these rubbers is not good, but it is quite probable that by incorporating other groups in the chain, and so replacing the reactive chlorines, this could be considerably improved.

Apart from these two types of nitrogen-phosphorus polymers, others can also be obtained with more complex ring structures (such as in Fig. A) or with elements other than chlorine, which by suitable treatment may form the starting point of extremely stable polymerized systems.

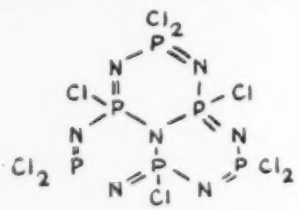
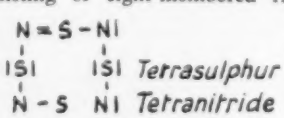


Fig. A

The simplest sulphur-nitrogen polymer is a yellowish, explosive solid, consisting of eight-membered rings.

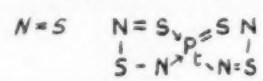


Tetrasulphur Tetranitride

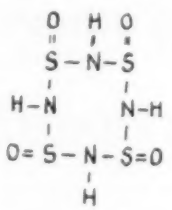
Fig. B

Controlled thermal decomposition produces the dinitride which in turn can be polymerized to a stable solid with a metallic lustre. It is interesting to note that this polymer is a semi-conductor. This characteristic can be explained on the basis of the assumed constitution of the polymer molecule, which assumes 'infinite' unsaturated chains of alternating nitrogen and sulphur atoms.

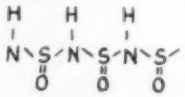
Although tetrasulphur tetranitride is not stable, the ring or its derivatives can be stabilized in a number of ways. One way is to introduce a transition metal into the middle of the ring to give a compound of the type.



In another method, careful oxidation preserves the ring structure and yields a stable polymer.



Other polymeric structures which can be considered as derivatives of the compound in Fig. B., after the ring has been opened, are a brown and a red stable solid, consisting respectively of units of



and of HO-S=N

Compared to the chemistry of carbon polymers, the chemistry of inorganic polymers is still in its infancy. Due both to historical accident and the real difficulties of theory and preparative techniques, relatively little research has been carried out on these compounds, and neither has it been of a very systematic nature.

These handicaps are now being turned into assets. The principles underlying the structure and behaviour of polymers have been learnt through carbon chemistry and they can now be applied to inorganic polymers in a systematic manner. Development of these compounds is going ahead spurred on by the stimulus of more and more exacting requirements demanded by new applications. As a result it is a practical certainty that in time inorganic polymers will win for themselves an ever-increasing share of specialized uses.

PI South Wales

YOUNG PEOPLE'S LECTURE

THE first Young People's Christmas Lecture to be organized by the South Wales and Monmouthshire Section was given by Dr T. T. Jones, Research Scientist with Monsanto Chemicals Ltd., on the subject 'Fifty Years of Polymers and Plastics.' It was held in the large chemistry lecture theatre of University College, Cardiff, by kind permission of Professor A. G. Evans, and the demand for tickets from local grammar schools was such that the lecture had to be given twice, on January 6 and 7, a total of 415 boys and girls attending.

Taking Dr Baekeland's historic paper of February 1909 as his starting point, Dr Jones showed his audience how polymers can be formed by addition and condensation polymerization and then went on to describe the manufacture, processing and properties of the more important plastics developed over the past 50 years. The lecture was illustrated by demonstrations, of which the most popular was the preparation of a 10,2 polyamide by interfacial polycondensation, and by lantern slides and concluded with a showing of the film 'The World that Nature Forgot.'

The Section chairman, Mr S. V. Griffiths, presided on the first day and Mr E. H. Vokes on the second. The vote of thanks was proposed by Mr S. D. Eagleton (hon. secretary) and was carried with acclamation by an enthusiastic audience.

PI London Section

PREPLASTICIZATION SYMPOSIUM

THE meeting arranged for Tuesday February 2, at the Wellcome Building, Euston Road, London, N.W.1 will take the form of a symposium on 'Preplasticization in Injection Moulding.'

The symposium will be divided into two parts. The first from 4 p.m. until 6 p.m. will consist of prepared papers given by Mr J. S. Walker of Fraser and Glass Ltd. and representatives of Ankerwerk, Projectile and Engineering Co. Ltd., and R. H. Windsor Ltd. The second part, following a break for refreshments between 6 and 6.45 p.m. will be devoted to a general discussion.

Mr W. Ritchie has been appointed a director of Seafield Amalgamated Rubber Company.

VIEWS and REVIEWS

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **Dr Schidrowitz**

Progress of Applied Chemistry

THE *Reports on the Progress of Applied Chemistry* issued annually by the Society of Chemical Industry (Vol. XLIII, 1958) have appeared during the past few days. The fact that they have appeared somewhat late is not to be wondered at, for 1959 was the year of the printing stoppage, which must have caused the getting together of 911 pages of matter—including 164 pages of indexes (Name and Subject)—no little trouble. If we consider that the total pagination for 1957 was almost exactly the same, but that the Indexes are about 25 pages in excess of 1957, the result, quantitatively, is remarkably close, but quantity is no measure of quality and all that can be said of the latter is that the *Group* report is about the same in both years.

Subdivision of Matter

Although the subdivision of matter is much the same in both years—Organic and Inorganic Chemistry following one another in that order in 1958, and in 1957 they were in the reverse order and separated by Metals—there is otherwise little difference, and little object in pursuing that difference. In 1958 *Rubber* (one of the 'Biological' Products group) is by A. E. T. Neale (Dunlop).

An interesting point here is that 'Rubber' is, as regards 'Group,' classified as in the past under 'Biological' Products, and one might well inquire whether the dog wags the tail or vice versa; however, the point is academic, particularly as the author states that it has been estimated that the world production of 'Natural' for 1958 would amount to 1,915,000 tons, and 1,237,000 tons for synthetic. The author quotes Klippert of the *Times of Indonesia* for a requirement of 6,000,000 tons per year by 1980. There will be, most certainly, a critical period in 1960 to 1965 insofar as the extensive replanting of NR in recent years will not have become sufficiently productive until after this period. In the USA, SR is already being used to the extent of 63% of the total consumption, and elsewhere it will become necessary to raise the present average of 22% to 34% or more by 1962. Thus, there is some urgent necessity in increasing the production in countries outside America and new factories for production have come into operation in the UK, West Germany and Italy, whilst others are planned in France and the Netherlands.

Quality

'Quality considerations still demand a certain minimum proportion of natural rubber, and synthetic 'natural' rubber may well help in tiding over the difficult supply period if its production can be made a commercial proposition.' Thus Mr Neale. He proceeds: 'Although it has been said that in the event of emergency polyisoprene production could be undertaken in 90 days, isoprene is not yet available commercially. Opinion has been expressed that synthetic "natural" rubber may be too costly for normal use, but the erection of a plant to produce 25,000 to 30,000 tons of Natsyn has been announced.' This is, I consider, one of the most interesting statements that I have heard on the point.

Planting

On this matter, it is held that 'Root disease is now recognized as the largest single factor responsible for reducing potential yields in Malaya and revised advice on treatment with tar acid fungicides has been given. The results of manurial experiments laid down some 20 years ago in Malaya are now available and some more recent investigations made in the East Indies show how leaf analysis and soil analysis can serve in the selection of fertilizers.'

Studies at the Rubber Research Institute of Malaya indicate the importance of trace elements in the growth of the tree and the composition of the rubber produced. These studies appear to be important but are complicated. The following quotation will show the complexities of the problem: 'Magnesium and manganese deficiences occur in plants in Malaya, but small increases in magnesium supply can increase the manganese deficiency and the latter can only be overcome at high levels of magnesium supply.'

Latex Preservation Systems

Because of the many ammonia-resistant bacteria on the plantations, many alternative preservation systems have been examined and latices based on about 0.2% ammonia, with the addition of another preservative such as ammonium pentachlorophenate, an aminophenol or other material are now marketed and proving acceptable.

Alongside these practical considerations, the comparative bacteriology of Hevea latex has been studied and is being established; some thousand strains of bacteria have been isolated and the waste sera from coagulation or centrifugation have been shown to be excellent media for bacterial culture. The methods devised for the accurate evaluation of the numbers of bacteria present in latex are of value in control of new preservatives and the storage behaviour of the latex produced.

Foam

When, however, the latex is foamed, the product is known to exhibit marked bactericidal properties, and recent work by Döle *(Plaste u. Kaut.)* seems to have confirmed this activity against *Staphylococci*, and the more resistant *B. pyocyaneus*. Certain isocyanate foams do not possess this activity (Asang and Johne), but both types of foam can be sterilized for hospital use by formaldehyde.

Latex provides a convenient medium in which to carry out graft polymerization, and it has been shown that methyl methacrylate graft polymers made by gamma irradiation polymerization are superior to those produced by redox polymerization. An interesting development of graft polymerization by mastication is the report of the formation of an interpolymer between natural rubber and butadiene-styrene rubber by milling in an inert atmosphere.

I propose to continue my review of this Report in next week's *RJIP*.

PHILIP SCHIDROWITZ

Questions Corner—102

(Second Series)

427. What methods have been adopted for compensating for roll flexure in calenders?

(Answer next week)

Answers to Questions Corner—101

423. Machine conditions for the extrusion of profiles and piping in polythene resemble those for the extrusion of sheeting, except that faster haul-off rates can be used.

In pipe extrusion, a molten tube is extruded and its outer surface chilled for retention of shape. The pipe is then cooled to room temperature. Various procedures are used for this. The molten tube may be extruded and sized over a water-cooled mandrel and, at the same time, internal air pressure may be applied to size the pipe which can be extruded into a water tank, or water-cooled forming box which shapes the outside pipe diameter. A series of air-cooled internal and external sizing rings can also be used.

Temperatures across the cylinder range from about 135-175°C. and the die temperature should be about the same as the cylinder temperature. The complexity of the die is dependent on the shape to be extruded. Screw temperature and speed are both high when high output is required. The screw temperature ranges from about 40-60°C.

Haul-off usually takes place through one or more water troughs, and frequently through a device to check the width and gauge of the cross-section for winding up on a simple friction-type clutch assembly, or through a shearing device to cut the pipe into lengths. Pull rolls are used for the pipe haul-off, and the relative speeds of the haul-off equipment and the extruder controls the pipe dimensions.

424. Polyvinyl butyral achieved prominence because of its use in the manufacture of safety glass; in these laminates, properly plasticized, it will adhere to broken glass and not permit shattering. Even the cracked laminate retains quite a good strength.

Polyvinyl butyrals are tough, light stable, clear and moisture resistant. Their solubility varies with the hydroxyl and acetate content, but they are all relatively resistant to water and hydrocarbons. They are attacked by aqueous caustic soda and aqueous sulphuric acid. As solvents, the lower alcohols, or mixtures of these with aromatic hydrocarbons, ketones, esters and cellosolve are all useful.

Acetone-soluble butyral resins can be be made insoluble to acetone by treating the suspended polymer with 0.01-0.10% aqueous sulphuric acid at 65°C. (USP 2,358,355). Polyvinyl butyral has been used for fabric coating and a small percentage of phenolic resin is included in the formulation to serve as a cross-link agent in order to make the coatings less sensitive to heat and solvents.

Fabrication temperatures and physical properties depend on the proportion of acetal groups and plasticizer. Tensile strength at break ranges from 1,000 psi to 3,500 psi, which is high considering the softness and low initial modulus. Films from a plasticized low hydroxyl type gave the following properties: Tensile strength, 1,470 psi; elongation at break, 300%; tear strength, 120lb./in.

425. Machines used for mixing thermoplastics fall into three main types: roll mills, internal mixers and extruders.

The first is usually in the form of a two-roll mill, with parallel rolls which rotate in opposite directions. There is only a relatively small space—nip—between the surfaces of the rolls. The material is placed in the nip and forced by friction between itself and the rolls, and is deformed and flows through the nip in the direction of the motion of the rolls. These machines vary in size from laboratory types 6in. wide (roll width) to 80in. wide. The rolls are cored for steam heating and water cooling.

Internal mixers use the principle of a cylindrical container inside which the material is deformed by rotating blades or rotors. The rotor blade tips clear the inside segment of the container by a very small amount. The blades interact to cause a 'folding' of the mass in a very complex way. The sheel and rotor are provided with means for heating or cooling. These machines vary in size from laboratory models with a capacity of 2lb. to large units of 150lb. or so. It is usually convenient to sheet out the lumps discharged from the mixer by means of a two-roll mill.

The extruder, though not primarily designed as a mixer, is finding increasing application in cases where mixing and extruding can be performed together.

426. When applying a finishing coat to furniture it is customary to include a small percentage of a flatting agent in the final coat to simulate the soft dull finish associated with hand polishing. One of the materials used is aluminium stearate, but some sacrifice of film clarity, toughness and water resistance results.

Polyacrylonitrile has been used as an alternative, giving a finish of good clarity, water resistance and toughness. The polymer is best dispersed in the lacquer or varnish by conventional paint grinding techniques.

In pigmented paints and enamels, films of low gloss are usually produced by increasing the ratio of pigment to binder. For some purposes this must be kept as low as possible, and the addition of a small amount of polyacrylonitrile to an enamel can be used to produce a semi-gloss or eggshell finish, without sacrificing adhesion or elasticity.

A typical formulation for a flat lacquer is given in 'The Chemistry of Acrylonitrile,' American Cyanamid Co., 1951:

½ sec. nitrocellulose (dry weight)	100
Alkyd resin	100
Polyacrylonitrile	7
Dibutyl phthalate	15
Blown castor oil	15
Butyl alcohol	120
Butyl acetate	240
Ethyl acetate	360
Xylol	480

(Another question next week)

Pipe Firm Merger

Durapipe and Fittings Ltd. have merged with the Plastics Division of H. Incledon and Co. Ltd. Both companies are in the Incledon and Lamberts Ltd. group and the combined organization will operate from their present address at Winnock Road, West Drayton, Middlesex.

The new company will continue to trade under the name Durapipe and Fittings Ltd., and has a very wide range of moulded thermoplastic pipe fittings and pipe, in sizes from ⅜in. to 6in. in three types: High Impact PVC, Kralastic and High Density Ziegler Polythene. The company specializes in thermoplastic pipe and fittings for the conveyance of corrosive fluids.

'Centrifuge — Bach Centenary'

MEN *and* MATTERS

A Review of People and Events

by George A. Greenwood

ONE of the most interesting items this week, although perhaps slightly 'off-beat' as far as our industries are concerned, was the announcement that the De La Rue Group has linked up with the—I almost said 'legendary'—Wells Fargo Armored Service in the formation of a new company called Security Express, which is to provide United Kingdom pay rolls and other cash or valuables with a special 'bodyguard' service, and insured protection in transit. All kinds of contingencies are provided for, and it is really not my function to expatiate upon them, but the link-up does provide an opportunity to say a word or two about two of the individuals much concerned in its establishment.

One is Sir Percy Sillitoe, well known as the former Director-General of MI 5, who for many years was both a phenomenal and a controversial figure in British administration and public life, and a brilliant, and not unkindly, taskmaster, as I have some reason to know, although I must hasten to add that I was never within MI 5 clutches!

Mr A. G. Norman

The other individual involved is Mr A. G. Norman, the managing director of De La Rue, who is credited with having in part originated the idea, and brought De La Rue and Wells Fargo together—all of which goes to indicate Mr Norman's versatility. Very few people know how he came at all into this particular organization, but the fact of the matter is that he was specially recommended to Mr B. C. Westall, the De La Rue chairman, by the careers master at Blundell's who was so much impressed by this exceptional pupil of 17.

That was in 1934. Now at 42, Mr Norman has a brilliant commercial career to look back upon and the promise of an even more brilliant future. He is incredibly young in appearance, but perhaps even younger still in ideas and imagination. It is common knowledge that although in the beginning he was largely concerned with playing card production and then bank note printing, he has also played a prominent part in the striking development of the Combine's plastics interests, and is especially proud not only of the increasing place which Formica is playing in the national economy, but also of the works system which is in operation at the factory.

The employees there operate a 37½-hour week and working conditions are said to be exceptional. Every hourly worker has two weeks and two days' holiday a year, the extra two days, when taken at Easter, ensuring a clear week's break.

There are just two other points which are worth noting about Mr Norman. One is that with the goodwill and co-operation of his colleagues he has ensured that every one of the De La Rue subsidiaries, including Formica, are largely autonomous. The other is his almost uncanny capacity for selecting the right men as executives, and then giving them their head.

CIBA Appointment

Mr C. N. Powis is now in control of the marketing of 'Redux' synthetic resin adhesives, used for bonding friction linings for motor vehicles, industrial plant, and other applications. Mr Powis has been at CIBA (ARL) Ltd. for the last four years, where he has been engaged on special development work with the Bonded Structures Division.

C. N. POWIS

Fluorescent Evidence

Romac have thought up a good one. This firm of motor accessory manufacturers were worried when a number of customers complained of late delivery when, in fact, the goods were sent on time.

Now all Romac's customers can see exactly when the goods were sent. Stuck on all parcels is a fluorescent label bearing the legend 'This parcel left our works . . .' and the date of dispatch. To indicate the method of delivery there are three types of label: one shows the silhouette of a locomotive, another a commercial van and the third a pillar box.

This should certainly help to preserve goodwill— and the fluorescent eye glaring from the parcel may even encourage an earlier delivery.

No Inky Fingers!

Filling a fountain pen can be a messy business, particularly when you're reaching the bottom of the ink bottle. Now a new plastic bottle, marketed by Stephens, enables you to fill your pen without getting a spot of ink on your fingers.

By pressing the sides of the bottle a supply of ink can be drawn up into a special well, from which the pen is filled—there's no need to go down to the bottom of the bottle. The well is moulded by Metal Box in Rigidex high density polythene supplied by British Resin Products Ltd.; the bottle is produced in ordinary polythene.

Vigour and Drive

Elsewhere in this issue it is announced that the International Synthetic Rubber Company have started to expand the annual capacity of their Hythe plant from 70,000 to 90,000 tons. Following so closely upon the commencement of construction of a plant for the production of 2,500,000 gallons a year of rubber latex to be used in mattresses, cushions, car upholstery and so on, this expansion reflects the vigour and drive of ISR and gives a good indication of the swing to synthetic rubber which is now taking place, both in the UK and overseas. I understand, incidentally, that in the UK the annual consumption of solid SBR rubbers, 45,000 tons

in 1958, rose rapidly last year and now stands at about 60,000 tons.

Even in today's climate of 'explosive'—if I may use the term—scientific development, the progress of ISR is outstanding, for it was only in 1958 that bulk production at Hythe began. This progress which has been based on solid achievement and confident forecast is due to the enthusiasm and ability applied to ISR's whole range of activities and, above all, to the foresight and co-operation of Britain's vigorous and expanding rubber industry.

Pantomime Party

Last Saturday twenty coach loads of excited children went off to the pantomime to see Robinson Crusoe at the Finsbury Park Empire. All 800 of them were children of the staff of the London Rubber Co., enjoying their annual party.

I understand that there was no lack of adult volunteers to look after the children—who all got a present of a packet of balloons manufactured by the company.

Firestone Appointments

H. H. Wiedenmann, recently elected vice-president for tyre production, celebrated his thirtieth anniversary with Firestone Tire and Rubber Co., Akron, Ohio, in 1958. Mr Wiedenmann has served the company as a production employee, member of the development department, general foreman, manager of tyre plant, and manager of fuel cell division. In 1950 he was named factory manager of the Pacific Coast plant. He became manager of Akron tyre plants in 1952 and production manager of North American tyre plants in 1954.

H. WIEDENMANN

Other recent appointments are: E. H. Schulenberg has been made vice-president and treasurer, and E. B. Hathaway has been made vice-president in charge of sales. Both have been elected to the board of directors.

World Tour

I hear that Mr T. Clyde Hewlett, export director of the Anchor Chemical Co. Ltd., Manchester, is leaving towards the end of this month for a sales tour that will take him round the world. With him will go Mr R. S. Rushton, one of the personal assistants of John Carrington, the 1959 Hancock Medal winner. Their trip, which will last for some 10 weeks, will take them to the USSR, Pakistan, India, Hong Kong, Japan, Australia, New Zealand and the USA, all of which already figure on the long list of countries to which Anchor exports.

More pictures taken at the Manchester Section IRI Dinner Dance

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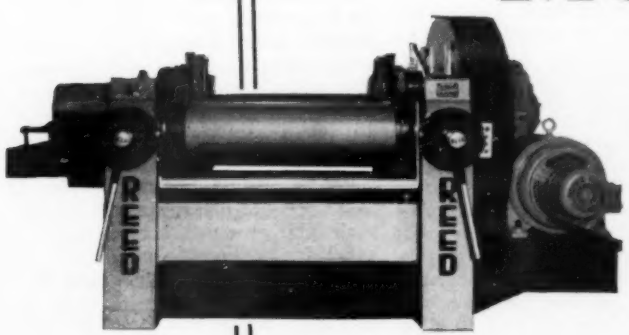

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Rubber Cushioning and Upholstery

IMPRESSIONS OF A SYMPOSIUM

SO very often after having 'been on a course' one is left with the impression that, pleasant as it has been, perhaps it was rather a waste of time with so many more urgent things to do. On looking back to the recent Symposium at Attingham Park in Shropshire on 'Rubber Cushioning and Upholstery,' however, I have left a feeling of time well and pleasantly spent. The setting, the lectures, the informal discussions, the mixture of boffins and businessmen and the bar below, all added up to a perfect whole, and the organizers deserve praise indeed.

The Symposium was organized by the Research Association of British Rubber Manufacturers in association with the Furniture Development Council to provide as the programme stated 'practical information on the properties and characteristics of cushioning, based on synthetic materials as well as natural rubber.' The holding of the Symposium was felt to be essential in the light of recent developments in the field of plastics foams.

Mustard Keen

After a pleasant first evening during which the 'new boy' feeling quickly disappeared, we plunged straight into the first lecture at 9.30 on Tuesday morning. This was a paper read by A. L. Soden on 'Different Kinds of Foam, Natural and Synthetic,' which very well laid out the subjects we were going to cover during the next two days. And by the questions afterwards it was easy to see that everyone was as keen as mustard to get as much out of the course as possible.

After this, A. E. Eagles presented a paper on 'Load-Deflection and Other Elastic Properties.' Many interesting points were made, illustrated by graphs and there was a model of a rig for testing hardness and set of latex and plastic foams.

Permanent set and speed of recovery are two factors of great importance to the designer and manufacturer of upholstered furniture and have arisen mainly since the introduction of plastic foams. To quote briefly from Mr Eagles' paper in regard to permanent set—various foams were compressed to 50% for 22 hours, then the permanent deformation measured after 30 minutes' recovery, giving the following figures: Natural latex foam 5-10% set. Polyester foam 5-20% set. Polyether foam 6-30% set. Synthetic latex foam gave the same figures as natural latex and with polyether foam a very slow recovery continued for some days after the test period.

In the afternoon, R. L. Dunn gave an extremely interesting paper on 'Use of Foamed Rubbers.' Amongst a wealth of very valuable information which Mr Dunn gave us, I would like to quote two examples only.

First 'A standard practice accepted within the industry is one related to the fitting of covers, and the designer must realize that he is dealing with a permeable material which is very resilient, and ensure that the product is always bigger than the cover with which it is to be fitted. Within my own company the practice has always been to allow a positive compression tolerance of 1.75% in all directions, and this figure, combined with the customer's nominal size, has formed the product mean size. Again, the mean size has been subjected to the manufacturing tolerance of 2%, so that our manufacturing limits have been: Minimum=nominal + 0.75%. Mean=nominal + 1.75%. Maximum =nominal + 2.75%. It is fairly obvious that the heavy covering materials are much more difficult to fill out than the lightweight materials, and in my opinion the addition of a further 1% is necessary to do justice to the heavy cover.'

Weak Edges

Later in his paper, Mr Dunn said 'When applying polyether in the form of a reversible cushion it is essential to remember that the density of the material is low, the volume or bulk of material is high, and that the edges of the material will be weak locally, and soft to the touch, whereas the lateral and longitudinal resistance will be higher than that of a latex foam cushion. It is, therefore, necessary to provide a generous cover compression allowance in the depth of the cushion, while a small percentage oversize must be allocated to length and width.'

In the evening, R. Chaplin, M.A., Deputy Warden of Attingham Park, gave one of the most brilliant talks I have ever heard on the history of British furniture, particular stress for our benefit being put on upholstered chairs. His talk was illustrated by superb colour photographs.

Feel and Comfort

Next morning Mr Moakes in his paper on 'Preparation and Use of Purchasing Specifications,' went into specification tests—mechanical, ageing, chemical; and all this linked with a down-to-the-ground approach of linking specifications to the purpose the material is going to be used for. A very important factor as far as I see it—yet lost sight of all too often.

After coffee, M. J. Merrick of the Furniture Development Council, spoke on 'Properties, Feel, Comfort and Durability.' 'The "feel" of a foam,' he said, 'arises from a combination of a number of different properties, the elasticity, the resilience and the "strain delay" being the most important.' And lastly 'regarding comfort, little is known of this. All the foams "breathe"; that is, they take in and expel air when expanded and compressed, so preventing build-up of high humidity or temperature. There appear, however, to be no tests to measure this property, at least tests which mean anything. Regarding the feel and general comfort of these materials, no absolute values exist but the tendency to regard latex foam as the ideal may not be correct.'

My own paper came next, the subject being 'Design with Foamed Materials.' In this I aimed at linking up the whole aspect of design of upholstered furniture with foamed materials. What, however, I wished to convey was that it was the perfect chair which matters, not the ways in which it had been achieved.

The lecture part of the course was rounded off by Mr Merrick when he discussed 'Future Developments' and covered such points as the moulding of polyether, three-dimensional forms, moulding and the establishing of basic principles of comfort.

At the end of the course Mr J. C. Pritchard took the chair for a critical discussion of the course and on what lines it might be held again. A symposium must surely be a success when the participants at the end of it regard it more as a beginning!

Synthetic Latices

SHORT COURSE AT NATIONAL COLLEGE

DURING the opening lecture of the five-day full-time short course on Synthetic Latices, recently held at the National College of Rubber Technology, the course organizer, Dr Blackley, stressed some of the unique features of polymers in latex foam and of latex techniques in general.

The first subject dealt with in the course proper was the production of synthetic latices, and by way of introduction, a comparison was made of available methods of bringing about polymerization. The advantages and disadvantages of the emulsion process were indicated.

The general properties of synthetic latices were also discussed. The subject was introduced by way of an overall contrast with natural rubber latex. Particle shape, size, size averages and size distributions were considered briefly, together with methods for investigating these properties. The question of latex viscosity was discussed in relation to particle size and size distribution. Two aspects of latex stability were considered; first, the stability of the isolated particle and its possible interactions with the serum; secondly, the stability of a collection of particles. Both these aspects are important in practice, and sometimes, as for instance in the case of polychloroprene latices, instability in the first respect can lead to instability in the second. In dealing with the interactions between particles in systems where more than one is present, reference was made to latices as delicately balanced systems, essentially thermodynamically unstable, but deriving apparent stability from the existence of a barrier preventing the rapid attainment of the thermodynamically stable flocculated condition.

Mr Healey then described the specific coagulation behaviour of particular synthetic latices, making the practically very important distinction between flocculation, coagulation and gelation. The mechanisms of gelation and syncresis were considered, and a description given of the effects produced by various types of coagulant. In this connexion, wet gel strength and the formation of coherent films were considered from the essentially practical point of view.

Mr Lever described a number of individual polymer latices, including PVA, butadiene - styrene copolymers, butadiene - acrylonitrile copolymers, polychloroprene, polybutadiene, polystyrene, polyvinyl chloride, and others. When assessing an individual type of latex, it was essential to consider whether or not the polymer it contained could be vulcanized, and if so, how. Second only in importance to this was the problem of plasticization, for several of the latices of otherwise rigid polymers would dry to coherent and continuous films only if they contained a polymer plasticizer.

Mr Healey discussed the manufacture of latex foam from synthetic latices. Particular interest was shown in the smaller overall shrinkage of SBR foams as compared with natural rubber latex foams of similar composition. This difference makes it difficult to use the same moulds for SBR and natural latex, if consistency in the dimensions of the final product is to be maintained.

Particular interest was shown in the use of SBR/natural rubber latex blends for various applications. Experience showed that permanent viscosity changes sometimes occurred, possibly associated with the exchange of protective surface - active substances between the two latices.

Considerable interest was shown in the economic aspects of high-solids SBR latex as a competitor to 60% natural rubber latex. The present high price of centrifuged natural rubber latex (20s. to 22s. per gallon) compared with SBR latex (around 15s. per gallon—prices at the time of writing) constituted a considerable advantage in favour of the latter. But, on the other hand, the manufacturer had to learn how to deal with the newer latices, and it would not always be a simple matter to adapt existing processes and equipment.

A series of practical exercises was arranged to illustrate some of the lecture topics. The course is to be repeated February 15 - 19, but no more bookings can be accepted. Consideration is being given to a second repeat when this can be fitted into the College programme.

CANADIAN PLASTICS

A lightweight, long-wearing and waterproof hospital sheeting which can be autoclaved, has been developed by the 'Fabrikoid' division of Canadian Industries Ltd. The new product consists of a tough 'Terylene' polyester fabric coated on both sides with a specially formulated rubber. It will be marketed under the name of 507 'Terylene' hospital sheeting. Extensive laboratory and field tests revealed the sheeting to possess excellent resistance to the action of oils, acids, alkalis and body excretions. Flexing tests resulted in no deterioration after 500 severe cycles and tests for water resistance showed it capable of withstanding 150lb. per sq. in. of water pressure. The sheeting can be chemically sterilized, autoclaved or washed.

Brick was the colour chosen for the new hospital sheeting because pigments used in brick colour are among the most stable known. They will not deteriorate in the cleaning cycles and will not rub off on white cotton sheets. Furthermore, a distinctive colour such as brick obviates the possibility of getting the sheeting mixed in with the cotton sheets in the laundry. The fabric used in the sheeting has extremely high tensile strength and is manufactured by Associated Textiles from fibre produced by C-I-L at its 'Terylene' plant at Millhaven, Ontario.

To be distributed through hospital supply houses across Canada, 507 'Terylene' hospital sheeting is available in 26-yard rolls, 40in. wide, at $2.27 per yard to hospitals. On quantities of 200 yards or more the price per yard is $2.22.

The body of the new 'Bijou' occasional four-seater saloon, recently announced by Citroen Cars Ltd., is moulded in Cellobond Polyester resins (British Resin Products Ltd.) and glass fibre by James Whitson and Co. Ltd. It is manufactured in five units: the body, including wheel arches and front flooring, the two doors, the front-lift bonnet and the boot lid. It is a completely new design and is built to Citroen's special requirements to suit the well-known 2CV chassis

Book Reviews

SOURCE BOOK OF THE NEW PLASTICS, Vol. I.—Edited by Herbert R. Simonds. (Reinhold Publishing Corporation, New York, and Chapman and Hall, London. 80s. net.)

Only a relatively small part of this book has been written by the compiler. After an introduction, he describes improvements in a number of established materials. Most of these improvements are of a chemical nature but there are occasional notes on processing.

The main part of the book is concerned with 'Producers' New Materials.' Here, we have a series of descriptions written by the actual producers themselves of a wide variety of new materials. At first sight this looks like a compilation of catalogues or leaflets but closer inspection shows that it has considerable merit. Many who have long awaited a particular type of plastic to suit their own requirements may find it described in the book, that is if they are prepared to search for it for the index is of little help. As an example of what may be found on page 214 is a photograph of aluminium beach ball formers for latex dipping which have been coated with a clear varnish known as Maraset.

The pages bristle with American trade names, many of which are little known in this country. This should stimulate factories here to devise similar products.

The final section, 'Federal-Sponsored Research,' gives an interesting review of developments sponsored by various United States Government Departments. Here, the names or initials appear to be too much even for United States citizens and a glossary of abbreviations is provided. We learn, for example, that GPO signifies Government Printing Office; OTS, Office of Technical Services; and USGRR has no connexion with Russia but means United States Government Research Reports.

This book will be found valuable to all seeking new or modified plastics. Apart from the short section describing work by Montecatini in Italy, everything described has originated in the United States. It is difficult to believe that there is nothing new in other countries.

MANUAL FOR PLASTIC WELDING—Vol. 3, POLYVINYL CHLORIDE.—By G. Haim. (London: Crosby Lockwood. Price 50s.)

Within its 300-odd pages the reader will find that in this book little or nothing regarding the welding of PVC is omitted. The author even has a chapter on the training of welders and gives a syllabus of courses, not only in England, but in several other countries also. Unlike some authors Dr Haim makes it clear that there are no frontiers in science and technology, and gives numerous references to inventions, methods of working, specifications and patents, which have appeared in many countries of Europe and also in the United States.

The illustrations are clear and well chosen, and effectively supplement the well-written text. The publishers are to be congratulated on breaking new ground by including six pages of coloured illustrations which are most effective and, together with the plastic (presumably PVC) binding in bright red, give what can only be described as a new look to this volume. By contrast, the style of the eleven pages of advertising matter at the end of the book appears old-fashioned. The title hardly does justice to all that the book contains for there are chapters on the lining of tanks and vats, PVC pipelines, PVC ductlines, and the use of PVC in industry generally. Despite its comprehensive nature it is not a compilation of the work of several authors, although it is stated on page 163, but not elsewhere, that chapter 14 on PVC pipelines has been written by E. A. O. Mange.

In his first chapter the author gives an outline of the chemistry and physics of polyvinyl chloride. This would have been more effective had some typical formulations for plasticized PVC been given, for there is nothing to tell the reader that plasticizers form a much greater proportion of a plasticized PVC compound than do stabilizers. A significant omission in this chapter is the mention of any kind of PVC copolymer, and how the properties of PVC may be modified by this and other means. In dealing with adhesives the author uses terms such as 'PC10' and 'PCA20' without any indication as to the meaning of these letters or the nature of the mixtures to which they refer, although in fairness it must be said that elsewhere sources of other types of adhesive are given.

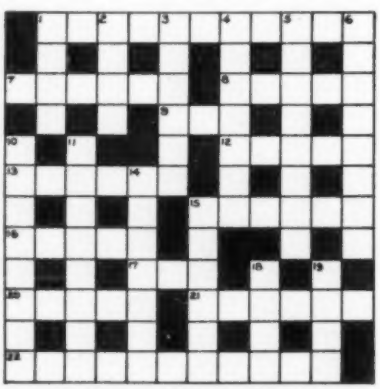
This is the third volume on plastic welding of which Dr Haim has been the author or co-author. It is a worthy successor to its predecessors and can be strongly recommended to all who are interested in the use of PVC for technical applications.

∴ Copies may be ordered through the Books Department, RUBBER JOURNAL AND INTERNATIONAL PLASTICS, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

Belgian Lithopone

S.A. Produits Chimiques de Nieuport have now completed the modernization and enlargement of their Lithopone Plant. The capacity for the production of Red Seal 30% ZnS Lithopone has been trebled. Samples and quotations may be obtained from their agents in the UK —Guest Industrials Ltd., 81, Gracechurch Street, London, E.C.3.

RJIP CROSSWORD



CROSSWORD No. 70

CLUES ACROSS

1. Treated with a halogen.
7. Not weak.
8. A number appears when ether takes a turn.
9. A new animal by the sound of it.
12. These sporting contests include the high card.
13. Formerly I led but was sent away.
15. A halogen loses a couple of letters for two shillings.
16. π, by the sound of it, is the beginning of a portion.
17. Back the RAC in your search for a vehicle.
20. Precise.
21. Reflector. Try the cord or rim back to front but not COD.
22. Get in with the rewards for bold undertakings.

CLUES DOWN

1. Akron has been described as the rubber —.
2. A country in the Far East which has been in the news in the past year.
3. An American quiz game was. So were sailing ships.
4. This type of rubber is not synthetic.
5. The pretty record contains reinforcement (4, 4).
6. Put on the top as fertilizer.
10. Polychloroprene.
11. An inflatable necessity for shipwrecks (4, 4).
14. Mr MacMillan has cause to be grateful to him.
15. The man of the land is not near at the start.
18. Sculpture, paintings, music, etc. a general term.
19. Not a gain but a loss from 2 down and then a point gained.

(Solution appears on page 181)

Plantation Commentary

'NO SPARE SOCKETS IN THEIR BELTS'

by our Malayan Correspondent

WORK on latex fresh from the tree, before it has had time to become 'chemically inactive,' is being done here by the Rubber Research Institute. Because of the special need to work on fresh latex, it is a programme that has largely been left to the Institute. Started some time ago, it may be stepped up as part of the new approach brought about by the Controller of Rubber Research.

The Institute has pointed out here that latex straight from the tree is still chemically active, and that within a few hours certain changes take place, after which it becomes inactive. In the early stages it is thought that there might be a chance to modify it in some way, possibly to improve it or to give it different properties. There is no certainty of success with research of this kind into the properties of fresh latex, but it might result in a new range of uses for natural. At present, once the latex has been removed from the tree it is coagulated into dry sheet or processed into latex concentrate. Work on this new line has been in progress for some time and is now likely to be extended.

There has naturally been some opposition to this programme within the rubber industry based on the familiar applied *versus* basic research argument, but the Institute's view appears to be that there is very little more that can be gained from the type of applied research that it has been doing. Better high-yielding clones may well be produced, but a high-yielding clone may take up to 20 years to develop. It is felt that two or three years of first-class research on the product may reveal a new line in a field which is, of course, considerably removed from the large amount of work which has been done on yield stimulation.

Attack on Synthetic Plants

A strong attack on American and British synthetic rubber plants, but principally on the United States and its stockpile release methods, was made here in a statement by the National Union of Plantation Workers. The statement demanded that the United States programme of releasing rubber from its stockpile should go hand-in-hand with a programme of reducing the amount of synthetic produced.

The statement said, 'We, the Asian workers, with our poor standard of living, are liable to be the victims of indiscriminate speculation. We hope that the US Government and the public will try to understand that the only way to fight Communism is to raise the standard of living of the workers. Words alone are not enough, we would like to see some action taken.

'All existing threats must be eliminated, and if anyone has to tighten their belts it should be the shareholders of the US rubber companies and not the workers of Asia and Africa with no more spare sockets in their belts.'

There has been no comment here either from the Malayan or United States Governments on this somewhat unusual union statement. It strangely came at a time when tappers generally are getting better wages following an increase up the sliding scale brought about by the higher price of rubber and the generally better output normally achieved in December.

Pay and Conditions in Malaya

It is difficult to compare the conditions and pay of Malayan estate workers with agricultural workers in Europe and elsewhere. Although they are generally lower there are other factors which make direct comparison impossible, such as the fact that with no frost and snow to keep out, houses can in general be of a cheaper construction and without chimneys, while there is no need here for a change of winter clothing.

Conditions also vary from estate to estate, and are generally less good, sometimes plain bad, on non-European-owned estates. Recent legislation, for example, decreed that estate hospitals should provide a change of clothing and proper mattresses and pillows as distinct from plank beds. This kind of legislation does not apply to the well-run estates, but is needed elsewhere.

Changes are also coming with the end of the emergency, and many estates no longer have to supply food in those areas where food was tightly restricted to starve out the Communist terrorists. Estates are rapidly improving labourers' lines in today's more settled conditions, often replacing the older type of 'line' with cottage-type houses. On a Johore estate there has been a recent report that labourers in their spare time are becoming skilled wild boar hunters, a profitable if exciting hobby, now that the jungle no longer holds Communists as well.

Some unusual sidelights on estate life in general in post-emergency Malaya were brought out by a recent Ministry of Labour report.

On a Negri Sembilan estate, for instance, a visiting medical officer is now examining each labourer every year and grading all the labourers and keeping their medical history. Those who do not make the medical grade are given treatment until they do, with an increase in production, higher earnings, and a more contented labour force. Two large estates elsewhere are reported to have a visiting medical officer who pays a monthly visit, in addition to the estate dispensary, giving a medical examination to all new recruits and examining all estate workers and their dependants once every six months.

Free cinema shows are becoming a regular feature on many estates, and another feature is prizes for cleanliness of houses in the labourers' lines or for well-kept gardens.

Typical of some of the amenities provided on estates are the three badminton courts, one basketball court, a football pitch and free transport to the nearest village by an estate in Pahang. In Negri Sembilan an estate provides estate sports every year, free cinema, free transport to a popular seaside resort, a football pitch and a children's playground.

These may not seem outstanding achievements compared with some companies in Europe, but they are symptomatic of general improvements being made today. There are also other problems such as those faced by an estate in Malacca which provides for its workpeople four Hindu temples, a mosque, a Chinese temple, and a Methodist chapel.

Another estate in Perak in a slightly unusual list of amenities provides 10 paid holidays a year, two tins of condensed milk for every infant every month, a free servant to look after children in the estate creche, and free electricity.

All these amenities are, of course, in excess of those required by law, though it has been stated that the law regarding standards on estates is now under revision.

There are also, inevitably, those who take a different attitude towards employees. The Ministry of Labour reported the case of a small estate employer who got his workmen to sign an agreement that they would waive their right to any workmen's compensation due to them and the women additionally to waive the right to maternity allowance. He was told that these ingenious agreements were null and void in law.

Another employer refused to pay maternity allowances on the highly moral grounds that the children were illegitimate. He was told to pay up, as were two estate owners who had tried to profit from the general ignorance of some women estate workers of the fact that they are entitled to maternity allowances. Between them they had to pay £121 to 23 women labourers as back allowances.

Semtex Ltd. have obtained a contract to install 1,800 square yards of Vinylex tiles in the palace of the Ruler of Qatar on the Persian Gulf.

Rubber Statistics

UNITED KINGDOM

DETAILS are now available of the rubber position in the UK up to the end of October last.

During the first ten months of the year, imports of natural rubber totalled 147,753 tons of crude and 26,949 tons of latex, or 174,702 tons in all. Re-exports amounted to 32,080 tons of crude and 2,432 tons of latex, leaving a new supply of natural rubber of 140,190 tons, though this figure does not include deliveries from the Government stockpile. The new supply of natural rubber during the corresponding period of 1958 amounted to 124,350 tons, the 1959 figure thus representing an increase of 12%.

Consumption of natural rubber during these months amounted to 125,781 tons of crude and 22,278 tons of latex, and exceeded the previous year's total by some 3,500 tons. Stocks of natural on hand at the end of October stood at 15,981 tons of crude and 4,279 tons of latex; of this amount, 6,588 tons were held in warehouses, while 13,672 tons were in the hands of manufacturers.

Net imports of synthetic rubber during these months amounted to 68,084 tons, and included 53,323 tons of S-type synthetic. Consumption totalled 63,198 tons, including 50,187 tons of S-type, and showed an increase of some 12,000 tons compared with the previous year. Stocks of synthetic on hand at the end of October stood at 7,808 tons of S-type, 1,407 tons of neoprene, 1,591 tons of butyl and 1,216 tons of N-type synthetic.

Reclaim rubber production during these months amounted to 35,016 tons, and after allowing for imports of 342 tons and exports of 8,754 tons, there remained a new supply of 26,604 tons, this figure showing little change compared with the previous year. Consumption of reclaim was up by a little more than 1,000 tons at 29,230 tons, while stocks fell during the course of the year to 2,327 tons, having begun the year at 3,433 tons.

Canadian Rubber

Consumption of rubber in Canada in November 1959 increased, compared with October, mainly reflecting a higher demand from the automobile industry. Consumption of natural was 4,145 long tons (3,870 in October).

Stock of natural at end of November was 3,566 long tons (3,527); synthetic 8,785 tons (8,634); and reclaimed 1,719 tons (1,840). Domestic production of synthetic amounted to 11,853 long tons (11,527). Production of reclaimed was 51 tons (548).

COMPANIES in the NEWS

BTR Industries

BTR Industries' group profits have fallen to £579,135 from £749,394. A final dividend of 10% is announced, thus reducing the total ordinary dividend by 2½% to 12½%. After a much lower tax charge of £250,182, against £401,274, net profits emerged at £328,953, compared with £348,120. The directors state that although adverse trading conditions continued for the greater part of the period, there was some improvement towards the end of the calendar year and the present outlook is encouraging.

Firestone

The third stock split within the last nine years for common stock of the Firestone Tyre and Rubber Company was approved at the annual stockholder's meeting held in Akron, recently. The split, which will be three shares for one, was recommended by the Board of Directors on November 17 1959.

On the effective date, on or about January 25, the authorized number of shares of common stock will be changed from 12 million shares with par value of $6.25 per share to 36 million shares without par value.

Plastics Statistics

DECEMBER IMPORTS AND EXPORTS

THE official Trade and Navigation accounts for December 1959 show that UK imports of plastics materials during the month amounted to 5,718 tons, compared with 3,191 tons in December 1958. The values were £2,051,937 and £1,252,312 respectively.

USA was the major source, supplying 1905 tons valued at £871,014. Imports from Western Germany were 1,637 tons, valued at £568,734. Total imports for 1959 were valued at £19,820,194 — the 1958 figure was £15,578,755.

Exports of plastics materials during December totalled 14,103 tons, value £3,573,770. Figures for 1958 were: 11,741 tons and £2,964,794. Of the month's total, Hong Kong took 1,483 tons valued at £328,635; Australia 940 tons—£420,826; Sweden 803 tons—£200,429; and Denmark 692 tons—£152,504. Total exports for 1959 were valued at £39,983,829—well over the 1958 figure of £32,146,382.

Details of imports of plastics materials during December 1959 are as follows:

	Tons	£
Alkyd solid and liquid resins, solutions, emulsions and dispersions	212	46,350
Cellulose plastics:		
Photographic (including cinematograph) film base (except acetate butyrate)	148	195,960
All other	220	197,524
Polyvinyl chloride:		
Polymers and copolymers	656	117,764
All other	555	207,636
All other	3,927	1,286,703
Total	5,718	2,051,937

Exports of plastics materials during December 1959:

	Tons	£
Acrylic sheet, rod, tube, film, foil and profile shapes in primary form	594	373,612
Aminoplastics:		
Solid and liquid resins, including solutions	1,194	141,396
Moulding and extrusion compounds	590	106,760
Cellulose plastics:		
Moulding and extrusion compounds	319	95,413
Sheet, rod, tube, film (excluding regenerated cellulose), foil and profile shapes in primary form	122	78,538
Phenolics and cresylics:		
Solid and liquid resins (straight and modified)	619	124,687
Other	519	191,655
Polystyrene	802	174,935
Polythene (polyethylene) sheet, rod, tube, film, foil and profile shapes in primary form	112	52,296
Polyvinyl chloride:		
Polymers and copolymers	1,516	211,559
Moulding and extrusion compounds	510	122,079
Sheet	562	229,834
Other	58	16,813
All other	5,586	1,560,472
Waste and scrap (including celluloid and film waste and scrap)	1,000	93,711
Total	14,103	3,573,770

PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Polythene

No. 819,867. K. Ziegler. Application and Filed, August 15 1955. Application in Germany, August 16 1954. Published, September 9 1959.

Polythene is produced by polymerizing ethylene in the presence of a catalyst which is a mixture of (a) an organic compound of aluminium, magnesium or zinc, and (b) a compound of a heavy metal of the *A* subgroups of the fourth to sixth groups of the Periodic System, including thorium and uranium. The feature of the invention is the production of polythene of a predetermined degree of polymerization by regulating the molecular ratio between the organic metal compound and the heavy metal compound in the catalyst between the limits 0.3:1 and 8:1. Examples are given showing the range of molecular weights which can be obtained by variation of this ratio. In one example in which a catalyst system comprising aluminium tri-isobutyl and titanium tetrachloride was used, the molecular weight ranged from 58,000 to 1,050,000 by regulating the molecular ratio of aluminium tri-isobutyl to titanium tetrachloride between 0.7:1 to 3:1. Reference is made to three prior Ziegler Specifications for the polymerization of ethylene, namely Nos. 799,392, 799,823 and 801,031.

Irradiation of Polythene Containing a Filler

No. 820,168. General Electric Co. Application and Filed, February 7 1956. Application in USA, February 15 1955. Published, September 16 1959.

The properties of polythene containing finely divided silica, or a metal silicate as a filler, are improved by irradiating the filled polythene with high energy irradiation. Other polymers may be blended with the polythene. Preferred fillers are silica, calcium silicate and aluminium silicate. Irradiation of filled polythene results in values for high temperature (145°C.) tensile strength, tear strength and cut-through strength superior to those for irradiated unfilled polythene and unirradiated filled polythene. The process therefore extends the applicability of polythene to service at higher temperatures than hitherto.

Vinylic Filler Pigments

No. 820,207. O. W. Burke, Jun. Application and Filed, August 21 1955. Application in USA, October 15 1954. Published, September 16 1959.

Vinylic fillers are combined with an organic and/or an inorganic colouring material to form a vinylic filler pigment. The vinylic fillers form the subject of Specification No. 799,043 (*RJIP*, November 29 1958, page 919). They consist of rigid particles produced by the homopolymerization and multipolymerization of polymerizable substances containing one or more unsaturated linkages, the polymerization products being cross-linked within the particles to a condition of insolubility. Among other applications, the vinylic filler pigments may be used for colouring and reinforcing natural and synthetic rubbers. Eighty examples are given of the preparation of the vinylic filler pigments.

Shorter Abstracts

Terpolymers. 816,618. Diamond Alkali Co. Filed, August 10 1956.—Terpolymers of styrene, acrylonitrile and maleic anhydride are claimed. The terpolymers are particularly suitable as suspension stabilizers in the polymerization of monomers, *e.g.* vinyl chloride.

Removal of Flash from Plastic Articles. 818,189. Universal Metal Products Ltd. Filed, October 3 1957.—The plastic articles are fed on to a vibrating conveyor and while travelling along the conveyor, the articles are repeatedly struck by a rubber pad which causes the projecting flash to be broken off.

Rubber Crop Returns

Unless otherwise indicated the figures quoted, to the nearest thousand lb., represent crop returns for the month stated and for the number of months of the planting company's financial year to date. Corresponding figures are given in parentheses.

RUBBER ESTATE AGENCY

December

Bandar Sumatra.—101 (117). 5 mths—501 (534).
Batu Kawan.—78 (71). 4 mths—285 (254).
Buntar.—130 (119). 18 mths—1,935 (1,655).
Eastern Sumatra.—385 (428). 10 mths—3,348 (3,437).
Amalgamated Rubber.—40 (41). 12 mths—379 (394).
Java Rubber Plants.—74 (93). 12 mths—877 (946).
Jeram.—350 (387). 3 mths—990 (819).
Kepitigalla.—73 (82). 9 mths—508 (534).
Kuala Lumpur.—724 (829). 3 mths—2,086 (2,103).
Langkat Sumatra.—83 (84). 12 mths—893 (900).
Soember Ajoe.—17 (31). 3 mths—40 (85).
Sungei Bahru.—158 (135). 6 mths—813 (659).
Sungei Kahang.—150 (141). 10 mths—1,585 (1,419).
Tambira.—135 (115). 6 mths—708 (707).
Tamiang (Malaya).—79 (90). 3 mths—229 (222).
Tanjong Malim.—361 (433). 6 mths—2,282 (2,166).
Sennah.—142 (134). 12 mths—1,658 (1,612).

THOMAS BARLOW AND BROS.

December

Bradwall.—164. 12 mths—1,644 (1,750).
Chersonese.—85. 12 mths—781 (694).
Highlands and Lowlands.—2,225. 12 mths—23,181 (21,101).
Krian Rubber.—11. 12 mths—118 (173).
Muar River.—306. 12 mths—3,093 (3,143).
Sungei Krian.—197. 12 mths—1,913 (1,945).

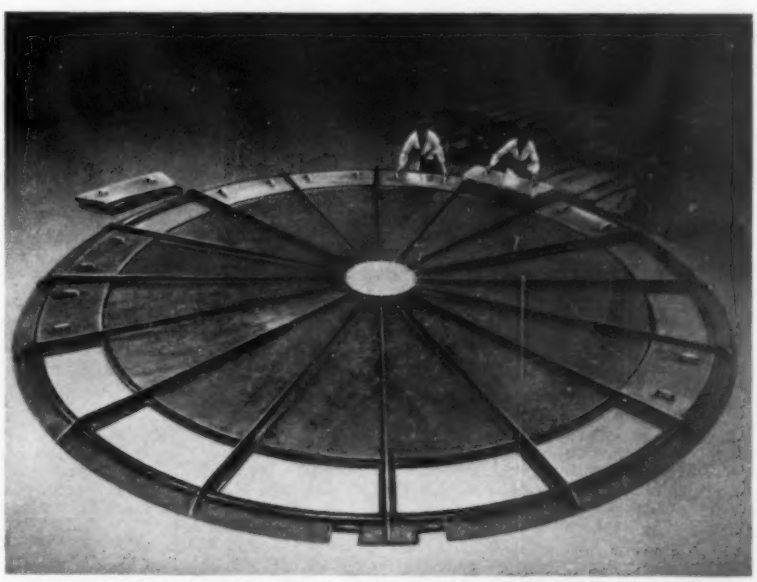
SHARPE, ESTALL AND CO. LTD.

December

Anglo-Johore Rubber.—29 (37). 5 mths—170 (166).
Bekoh CRE.—220 (238). 9 mths—1,839 (1,826).
KPRP—61 (68). 9 mths—548 (465).
Rim (Malacca) RE.—262 (275). 6 mths—1,410 (1,380).
Sittang Valley RE.—172 (163). 6 mths—575 (639).
Kurunegala.—34 (31). 12 mths—325 (336).

December

Kemasul.—41 (53). 12 mths—478 (515).
Inch Kenneth Kajang.—201 (197). 12 mths—2,050 (2,017).
Beau Sejour.—77 (62). 6 mths—356 (335).
Elpitiya.—3 mths—387 (364).



Thirty ft. solid resin reinforced glass fibre covers are being used on effluent settling tanks at the National Smelting Co's Swansea Vale works. Each cover is made in eight separate segments using a special system of epoxy resin/glass fibre and is designed to withstand acidic vapour. The covers are made by Permali Ltd., and the picture shows one in final assembly

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

THE step-up from 4% to 5% in Bank Rate was, of course, the big event in stock market affairs. Although expected for some time, the Bank of England's announcement took most dealers and investors by surprise. First action taken was to suspend business, and when books were opened after an appraisal of the news, quotations were widened and lowered to prevent any big selling.

As it turned out, apart from the speculation fringe element there were not many people prepared to panic and cash in on their paper profits—and once the dust had settled there was a general return to the up-line. So again the stock market was able to show remarkable resilience to what could have been a most delicate situation.

At one time during the past few weeks it did seem that the 'summit' had been attained. Two bank chairmen's warnings, plus a heavy dose of the TV programme Panorama unsettled the scene. During the cautious mood that followed many sections went into a somewhat tired decline. Our table below shows the irregular trend that developed.

As we have already said, however, things were looking brighter at the beginning of this week.

IMPERIAL CHEMICAL INDUSTRIES have eased just a little—from 60s. 3d. to 59s. 4½d. DUNLOP, too, are down on balance. Asbestos makers TURNER AND NEWALL, however, recovered well to 106s. 6d.

Another share 'barometer,' COURTAULDS, have been marked down sharply to 60s. 3d.; they took this toss following news of a bid for paint makers PINCHIN JOHNSON. This is yet another group to be absorbed in Courtaulds diversification plan. Cost of the deal? Probably in the region of £16 million plus.

ALBRIGHT AND WILSON, the chemical firm, sent out news that it was making a near £4,000,000 take-over offer for A. BOAKE ROBERTS, whose interests partly overlap their own. There have been rumours for some time that an offer was coming from Boake Roberts, and their shares have risen from a low point of 9s. last year. Albright's board expect to pay a final of 13¼% in respect of last year, which will make a total of 18 3/10% compared with an equal 13 3/5%. The Boake directors will pay out a second interim of 9½% in place making a final of 15½% against equal to 11¼%.

Among the plastic favourites, BRITISH XYLONITE, DE LA RUE, DISTILLERS and MONSANTO are all down on balance. BAKELITE moved against the general trend with a 2s. jump to 42s. 6d. BRITISH INDUSTRIAL PLASTICS also did well. The company is raising its dividend by 2½% to 22½%, and the directors propose to capitalize £1,476,812 of reserves and hand round free shares on a one-for-one basis. Group profits have expanded from £979,100 to £1,113,000. Tax this time

Continued on page 179

Share Price Movements

Par Value	Company	1959-60 High	Low	Jan. 16	Latest
£1	A.E. Ind. Ord.	67/-	54/-	65/-	63/3
5/-	Albright & W. Ord.	30/6	13/4½	28/3	26/6
£1	„ „ „ 5% Pref.	18/6	15/4½	17/-	26/6
5/-	Anchor Chemical Ord.	27/3	10/3	25/-	22/6
5/-	Andersons Rub. Ord.	4/3½	3/-	3/1½	3/1½
£1	Angus Geo. Ord.	39/6	21/-	36/-	38/9
5/-	Ault & Wiborg Ord.	23/6	11/6	22/6	20/6
£1	Avon India Rubber Ord.	46/3	27/-	42/6	40/-
£1	„ „ „ 6% Pref.	18/6	17/3	18/3	18/3
10/-	Bakelite Ord.	43/9	17/-	40/6	42/6
£1	„ 6% Pref.	19/6	18/3	18/-	18/3
£1	Baker Perkins Ord.	53/9	30/7½	52/6	53/9
4/-	Pank Bdg. Rubber Ord.	3/4½	1/6	3/4½	3/1½
5/-	Boake (A) Roberts Ord.	25/6	9/-	22/-	23/9
£1	„ „ „ 5% Pref.	15/1½	13/9	15/-	15/-
4/-	Brammer H. Ord.	17/6	9/6	16/3	17/3
10/-	Bridge, David Ord.	58/-	16/3	57/-	57/6
5/-	Bright, John Ord.	18/3	8/9	17/-	17/6
2/-	Brit. Ind. Plas. Ord.	12/9	4/9	11/3	12/4½
2/-	„ 10% (tax free) Pref.	5/9	4/9	4/3	4/3
£1	British Xylonite Ord.	87/6	28/6	85/-	83/9
£1	„ „ 5% Pref.	16/9	14/-	16/9	16/9
£1	BICC Ord.	61/-	46/3	59/-	57/6
5/-	BTR Ind. Ord.	13/3	8/1½	10/6	10/7½
£1	„ „ 7½% Pref.	24/3	20/9	23/9	23/3
£1	Courtaulds Ord.	67/9	20/-	64/4½	60/3
£1	„ 5% 1st Pref.	18/9	15/7½	17/6	17/3
£1	„ 6% 2nd Pref.	21/9	17/1½	20/9	20/3
4/-	Cow, P. B. Ord.	73/6	42/9	73/-	69/-
£1	„ „ 5% Pref.	12/6	10/-	12/3	12/3
1/-	Dannimac Mfg. Ord.	7/6	3/6	7/3	7/3
10/-	De La Rue Ord.	15/6	10/9	15/-	15/3
£1	„ „ „ 3½% Pref.	12/6	2/6	11/3	12/-
10/-	Distillers Co. Ord.	39/6	15/9	38/-	36/-
£1	„ „ 6% Pref.	22/3	19/10½	22/-	21/3
£100	„ 5% Conv. Loan	£96½	£91	£94½	£94½
£100	„ 5½% Unsec. Loan	£97	£87 7/16	£96½	£94½
10/-	Dunlop Rubber Ord.	29/-	14/9	27/1½	26/-
£1	„ „ 5½% Pref.	19/4½	15/10	18/6	18/3
£100	„ 3½% 1st Debs.	£77½	£67¾	£77½	£75½
£100	„ 4½% 2nd Debs.	£88	£78	£86	£86
£1	Eng. Elect. Ord.	61/-	38/-	49/9	46/3
4/-	Ebonite Cont. Ord.	15/3	7/6	13/10½	13/-
£1	English China Clays Ord.	80/-	29/9	84/9	87/6
£1	Goodyear Tyre 4% Pref.	12/9	12/-	12/6	12/4½
5/-	Greeff Chem. Ord.	31/9	14/-	31/3	30/3
10/-	Greeff Chem. 5½% Pref.	8/9	7/9	8/6	8/7½
5/-	Hackbridge Hldg.	19/9	14/6	17/3	16/3
4/-	Greengate & Irwell Ord.	7/0¾	4/1½	6/-	5/9
£1	Harrisons & Crosfield Dd.	83/3	43/9	56/9†	57/3
1/-	Hunt & Moscrop Ord.	2/6	1/1½	2/6	2/3
£1	Imp. Chem. Ord.	62/6	28/3	60/3	59/4½
£1	„ „ 5% Pref.	18/10½	16/-	17/6	17/4½
£100	„ 4½% Unsec. Loan	£90	£80	£88	£87
£100	„ 5½% Conv. Loan	£188	£99	£185	£182
1/-	Kleemann (O. & M.) Ord.	9/6	2/6	8/6	8/9
£1	„ „ 6½% Pref.	18/6	15/-	18/-	17/6
2/-	Lacrinoid Prod. Ord.	4/3	1/5¾	4/6	4/-
5/-	Laporte Ind. Ord.	31/-	13/7½	29/3	28/-
£1	„ „ 7½% Pref.	24/3	21/10½	23/3	23/9
£1	Leyland & Birm. Rubber Ord.	58/9	39/9	54/6	54/6
£1	„ „ „ 6% Pref.	21/3	16/1½	18/-	18/-
2/-	London Rubber	14/9	6/3	14/-	13/3*
£1	„ 6% Red. Cum. Pref.	19/9	16/3	18/9	18/9
£1	McKechnie Bros. Ord.	68/9	23/6	63/9	68/9
£1	„ „ 'A' Ord.	67/6	30/-	66/3	67/-
£1	„ „ 6% Cum. Pref.	17/-	16/-	17/-	17/-*
5/-	Monsanto Chem. Ord.	27/9	13/-	27/-	24/3
£1	„ „ 3¾% Pref.	13/6	11/-	13/-	12/3
£100	„ „ 6% Debs.	£104	£101¼	£104	£103½
£1	North British Rubber	21/3	15/7½	20/6	21/-
5/-	Redfern Holdings Ord.	5/9	2/10½	5/-	5/-
2/-	RFD Ltd. Ord.	6/6	3/5½	6/3	5/7½
£1	„ „ 5½% Pref.	16/3	11/6	16/3	16/3
2/-	Rubber Imp. Ord.	15/6	4/4½	6/6	6/4½
2/-	„ „ 'A' Ord.	14/3	3/9	5/3	5/4½
£1	„ „ 5% 1st Pref.	13/3	10/-	13/3	13/3
5/-	Rubber Reg. Ord.	18/3	10/6	18/-	18/-
4/-	Shaw Francis Ord.	25/-	9/9	24/6	23/9
2/-	Silentbloc Ord.	13/-	7/6	12/6	11/9
2/-	Sussex Rubber Ord.	1/11¼	7½	1/7½	1/7½
5/-	Sutcliffe Speak Ord.	13/-	5/-	12/3	12/6
£1	Turner & Newall Ord.	112/6	52/-	105/6	106/6
£1	„ „ „ 7% Pref.	25/6	22/1½	24/9	24/3
5/-	Universal Asbestos Ord.	38/9	8/0¾	33/3	36/3
5/-	Viscose Dev. Ord.	13/9	6/3	13/9	13/9
5/-	Warne William (Holdgs.) Ord.	17/6	8/-	17/3	17/6

*Ex-dividend †Ex-capitalization

Rubber Markets

LONDON

A firm trend has been maintained in the London rubber market during the past week and a general improvement in prices has been recorded. The main feature has been the renewed demand for nearby supplies and prices here record the biggest gains. These range to nearly a penny per lb. The Spot, however, is unaltered at 36¼d. per lb. Trading has been quiet.

Latest prices are as follows:

No. 1 RSS Spot: 36⅛d.-36⅜d.

Settlement House:

March 34⅛d.-34⅜d.

April/June 33⅛d.-33⅜d.

July/September 32⅜d.-32⅝d.

October/December 31⅛d.-31⅜d.

No. 1 RSS cif basis ports:

February 33⅝d.-33⅞d.

March 33⅛d.-33⅜d.

Godown:

February 114¾ Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, February, March, seller 20s. 3d., cif European ports. Spot, 20s. 9d. Bulk, 19s. 9d. Creamed, seller, February, March, 19s. 9d. Normal, seller, February, March, 15s. 6d.

AMSTERDAM

The Amsterdam rubber market ruled as follows on January 25:

	Guilders per kilo	
No. 1 RMA	Jan. 25	Previous
January	3.30	3.30
February	3.26	3.26
March	3.24	3.24
January March ..	3.26	3.26
April	3.18	3.18
May	3.18	3.18

Sales: Nil Tendency: Quiet

DJAKARTA

Some transactions of sheet No. 1 at 58 rupiahs per kilo were reported on January 25. No deals in sheet No. 2 and 3 took place. The market closed quiet.

	Rupiahs per kilo	
	Jan. 25	Previous
Spot No. 1 Prio't ..	57.00b	57.00b
Spot No. 2 Priok ..	56.00b	56.00b
Spot No. 3 Priok ..	55.00b	55.00b
No. 1 fine pale crepe spot	53.50b	54.00b

Tendency: Quiet

SINGAPORE

Very little interest developed and the market ruled inactive all morning on January 25. In the afternoon, business was confined to squaring of accounts. There was some buying of nearby No. 1 sheet. Factory interest was small. After-hours, the market was very quiet.

	Straits cents per lb. fob Malayan ports to open ports	
	Jan. 25	Previous Close
No. 1 RSS, Feb.	114¼–114⅜	114¼–114¼
Mar.	114¼–114⅜	114 –114¼
No. 2 RSS, Feb.	113⅛–114¼	113⅜–114¼
No. 3 RSS, Feb.	112⅞–113⅜	112⅞–113⅜
No. 4 RSS, Feb.	112¼–113¼	112¼–113⅜
No. 5 RSS, Feb.	110⅜–112¼	110⅜–112¼
No. 1 Spot ..	115 –115⅜	114¼–115¼
No. 3 blanket, thick remilled, Feb.	112 –114	112 –114
No. 1 fine pale crepe, Feb. ..	131 –133	130½–132½
2x thin brown crepe, Feb. ..	111⅜–112⅜	111½–112½

Tendency: Very quiet

The Industries Syndicate quote latex native produce, 60% centrifugal, packed in rectangular drums fob at 203.00d. per gallon.

NEW YORK

The New York rubber market ruled as follows on January 25:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Jan. 25	Previous
No. 1 RSS, Feb. ..	40a	40⅛s
Mar. ..	40a	40⅛s
No. 2 RSS, Feb. ..	39⅞a	40⅛s
Mar. ..	39⅞a	40⅛s
No. 3 RSS, Feb. ..	39⅞a	40⅛s
Mar. ..	39⅞a	40s
No. 1 RSS, Spot ..	40a	40⅛s
No. 3 amber blanket, crepe, April ..	39⅞n	Mar.–40⅛n
No. 1 latex, thin crepe, Feb. ..	44n	Jan.–44⅜n
No. 1 latex, thick crepe, Feb. ..	44n	Jan.–44⅜n

FUTURES—REX CONTRACT

	US cents per lb.	
	Close	Prev. Close
Jan. ..	39.90b–40.50a	39.90b–40.60a
Mar. ..	40.03b–40.10a	39.96t
May ..	39.25t	39.10t
July ..	38.50b–38.70a	38.25b–38.50a
Sept. ..	37.85b–38.00a	37.65b–37.90a
Nov. ..	37.25b–37.50a	37.15n
Jan. ..	36.55b–36.65a	36.65n

Sales: 17 Tendency: Steady

Rubber futures were steady in slow featureless trading. Interest in the market was negligible. Physicals were also quiet and steady.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on January 25 was 36.50 (36.50) US cents per lb.

CEYLON

No. 1 RSS

The price of No. 1 RSS spot at Colombo on January 25 was 131 (131) Ceylon cents per lb.

CENSUS OF PRODUCTION

The Board of Trade have issued provisional results of the 1958 census of production. The survey is based on detailed information returned by firms employing 25 or more persons.

Figures for the plastics industry show that sales (goods produced and work done) for the year amounted to £134.6m. (£83.4m.). (Figures in brackets refer throughout to the last census, carried out in 1954.) Net output of the industry was £49.5m. (£33.3m.).

The average number of people employed in plastics was 30,000 (22,600), and the total wage packet amounted to £21.3m. (£13.1m.). There were changes during the year of stocks of materials and fuel of +£0.1m. (+£1.1m.), and in work in progress and stocks of finished products of +£0.5m. (+£1.5m.). Capital expenditure during the year was £10.4m. (£5.1m.) on plant, machinery and vehicles, and £3.5m. (£1.5m.) on new building work.

Total sales for the rubber industry were £259.8m. (£220.9m.) during the year, and the net output was worth £101.0m. (£89.7m.). Average number of people employed was 106,500 (107,000), and the wages and salaries they received amounted to £63.4m. (£49.0m.).

There were changes during the year in stocks of materials and fuel of −£3.4m. (+£5.3m.), and in work in progress and stocks of finished goods of +£0.4m. (+£0.8). Capital expenditure during the year was £10.6m. (£6.5m.) on plant, machinery and vehicles, and 2.8m. (£5.13m.) on new building work.

Polyether Foam

Airfoam Corporation (Pty.) Ltd., Third Street East, Booysens Reserve, Johannesburg, one of the companies in the Laykella Foam Rubber group, in an investment of some £20,000 has initiated the production in South Africa of polyether foam. The latest available machinery for this purpose has been installed in the factory. It is expected that there will be a big demand from the upholstery industry and other users.

STOCK MARKET

Continued from page 178

absorbed £357,300 against £386,100.

ENGLISH CHINA CLAYS produced some good results. Profits here jumped a handsome £746,000 to a record £3,284,000. Sir John Keay, the company's chairman, lifted the dividend 1¾% to 8¾% tax free—their best ever. Topping off the good news he also announced a free share bonus of one-for-five. The shares have been a big feature recently and now stand at 87s. 6d.—a 2s. 9d. plus.

Industry INTELLIGENCE

Technical Data

Saran as a Cure Activator for Neoprene Latex Compounds

Saran is a very effective activator in the curing of neoprene latex products, the rate of cure with conventional accelerators at 140°C., as measured by volume increase in hot oil, being doubled by the use of 5 parts of Saran per 100 of neoprene. An investigation of the use of Saran for this purpose forms the subject of Du Pont Report BL-359, by R. O. Becker, available in the UK from the Du Pont Co. (UK) Ltd., 76 Jermyn Street, London, S.W.1.

Saran was added in the form of latex No. F122-A15 to compounded neoprene latices Types 571, 750, 842-A and 400. Films were prepared from the mixtures and vulcanized at 140°C. and 120°C. With neoprene latex Type 571, the effect of adding 2.5, 5 and 10 parts of Saran per 100 parts of neoprene (all dry weight) was investigated. At a vulcanizing temperature of 140°C., there is noticeable activity with 2.5 parts of Saran and considerably greater activity with 5 parts, but increasing the amount to 10 parts has little incremental effect. Saran has scarcely any activating effect at 120°C. The addition of Saran has little or no effect on the resistance of neoprene to heat ageing and to ozone or on its low-temperature properties. However, Saran increases water absorption of vulcanized neoprene films, as measured by immersion in water for 48 hours at 100°C., and it imparts a darker colour to the films. This combination of properties suggests its use in supported and unsupported films and saturated fibre products for heat and oil exposure.

Factice in Neoprene Compounding

Dark factice is a valuable processing aid for neoprene. It functions similarly as in natural rubber, with the additional feature that it can provide some control over swelling of the neoprene in oils. Four grades of Anchor dark factice, namely, 854, 819A, 1X and NBF2, are particularly recommended for use in neoprene, and the characteristics of these grades in relation to their use in neoprene compounds are described in Report No. 146/R/59, issued by the Anchor Chemical Co. Ltd., Manchester, 11.

Grade 854 is a special dark factice resistant both to swelling and extraction by oil. Grade 819A is a standard second grade dark factice, and in common with grades 1X and NBF2 it is not resistant either to swelling or extraction by oil. Grade 1X is a soft third-grade dark factice, and grade NBF2 is a very soft third-grade dark factice. All four grades provide control of nerve in calendering and extruding neoprene compounds, maximum control being provided by grade 854. Requirements specifically met by each grade in neoprene compounds are as follows: 854—Minimum swelling in oil and petrol, minimum extraction by aliphatic solvents, minimum deformation in open steam cures, maximum compound viscosity and reworking of uncured stock. 819A—Controlled swelling of neoprene vulcanizates in oil and petrol at the expense of some leaching, minimum deformation in open steam cures, higher breaking elongation than 854. 1X—Decreasing swelling in lubricating oils, higher breaking elongation than 854 and 819A. NBF2—Minimum swelling in lubricating oils, good mould flow, highest breaking elongation. Inclusion of NBF2 at loadings up to 25 phr. can completely counteract the swelling of a neoprene vulcanizate in lubricating oil of low aromaticity. Data are given for physical test results for each of the four grades of factice in a Neoprene GN compound containing 50 phr. of Dixie 45 (GPF black) and 25 phr. of the factice. The change in volume, weight and hardness of the vulcanizates after immersion in ASTM oil No. 1 at 100°C., ASTM oil No. 3 at 100°C., and ASTM fuel B at 25°C. is also reported.

Machines, Materials and Equipment

Eye Protection

Although eye protection is important in many industries, workers will often discard goggles which have become steamed up or dirty. Fleming Safety Equipment Ltd., 146 Clerkenwell Road, E.C.1, have produced a Lens Cleaning and De-Misting Cabinet to facilitate easy cleaning. The cabinet disperses a fine spray of cleaning fluid, and also tissues. Cleaning takes only a few seconds, and about twelve goggles or spectacles can be treated at the cost of one penny.

New Cleaning Fabric

A new material has now been produced for cleaning surfaces, which, unlike ordinary cloth, will not lead to contamination by dirt or dust. A puffed viscose yarn is used, in the form of a continuous filament, so that there are no short fibres to become detached. The texturing process produces minute loops along the filament, which give the material the absorbency which is needed in a cleaning cloth.

To make it easier to cut rags from the bulk material, which is manufactured by Courtaulds Ltd., 22 Hanover Square, London, W.1, 'cutting channels' are provided at 18in. intervals along both the warp and the weft. These enable the cutting blade to run cleanly at right angles to the thread, and reduce the danger that loose particles may be detached.

Re-Usable Gaskets

By a technique of bonding intimately a sheet of light metal to one of a rubber material, it is possible to produce reusable seals such as gaskets and washers which are positively leak proof. The rigidity imparted by the metal enables the seals to be removed and replaced many times without deterioration, and the elasticity of the rubber gives a high degree of compressibility with no 'creep' or 'flow' beyond the limits of the joint.

Manufactured by Fireproof Tanks Ltd., The Airport, Portsmouth, the material is supplied in sheets, and may be metal and rubber, a rubber-metal-rubber sandwich or a multiply. Various rubber materials (natural and synthetic) are available, and the metal is usually a light alloy.

New Publications

Fire Fighting

Nu-Swift Ltd., of Elland, Yorkshire, who claim to be the world's leading designer and manufacturer of portable fire extinguishers, have recently issued a 94 pp. booklet on their work and equipment. It classifies fire risks, and specifies models to be used in different circumstances. Well illustrated, the book has an answer for most fires: from the small outbreak that can be smothered by an asbestos blanket, to the 250 sq. ft. petrol fire that can be put out in 21 seconds by the 30lb. dry powder extinguisher.

Nylon-Corded Tyres

Some giant nylon-corded tyres contain 300 miles of nylon cord—this is one of the facts given in a new booklet produced by British Nylon Spinners, 68 Knightsbridge, London, S.W.1. Called 'It's Nylon for Tyres,' it shows in pictures how nylon is put into tyres, and lists the advantages that are claimed to more than off-set a slightly higher initial cost.

Cobex

BX Plastics Ltd., Higham Station Avenue, E.4, have brought out a new publication on Cobex (rigid vinyl sheet). Grades, sizes, special forms and properties are given in detail. A number of illustrations show Cobex used for a variety of purposes—from industrial safety goggles to a 65ft. high chemical tower. Technical data sheets are also available.

Future Events

INSTITUTION OF THE RUBBER INDUSTRY

Manchester Section.—Friday February 5 at the Textile Institute, Manchester. 'Acrylonitrile - Butadiene-Styrene Resins—Processing and Applications,' by J. S. Wilkie, B.Sc. (North British Rubber Co. Ltd.). Joint meeting with the Plastics Institute.

Midland Section. — Monday February 8 at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6.45 p.m. 'Natural Rubber in Perspective,' by D. J. Flunder, M.C. (Dunlop Rubber Co. Ltd.).

Preston Section.—Monday February 8 at the BTR Industries Social Club, Farington, Preston, at 7.15 p.m. 'An Accountant Will Talk,' by P. A. Land (BTR Industries Ltd.).

Southern Section. — Thursday February 4 at the Southampton University at 7.30 p.m. 'Plastics and Rubber under Extreme Operating Conditions,' by E. W. Russell (RAE, Farnborough). Joint meeting with the Plastics Institute.

South Wales Section. — Monday February 1 at the Royal Hotel, Cardiff, at 7.30 p.m. 'Bonding Systems,' by Mr W. A. Gurney, B.Sc., A.Inst.P., A.I.R.I. (Dunlop Rubber Co. Ltd.—Research Centre). In the chair, Mr W. Saul, F.I.R.I., chairman of the section.

PLASTICS INSTITUTE

Midlands Section. — Monday February 8 at the Grand Hotel, Leicester, at 6.45 p.m. 'Adhesives for the Packaging Industry,' by F. H. Garside (Leicester Lovell and Co. Ltd.).

Southern Section. — Thursday February 4 at Southampton University at 7.30 p.m. Joint meeting with Institution of the Rubber Industry. For details see above, IRI Southern Section.

Two Danish shipyards have placed contracts with Semtex Ltd. for flooring materials. One order, at Naksor, is for 2,350 square yards of Vinylex and Semastic tiles for three ships.

Solution to RJIP Crossword

(See page 174 this issue)

ACROSS.—1, Chlorinated. 7, Strong. 8, Three. 9, Gnu. 12, Races. 13, Exiled. 15, Florin. 16, Piece. 17, Car. 20, Exact. 21, Mirror. 22, Enterprises.

DOWN.—1, City. 2, Laos. 3, Rigged. 4, Natural. 5, Tyre cord. 6, Dressing. 10, Neoprene. 11, Life raft. 14, Elector. 15, Farmer. 18, Arts. 19, Loss.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

DEMCO

(791,036) All goods included in Class 17 made from polyvinyl chloride plastics. D. M. Industrial Plastics Ltd., Kingsbridge Road, Cottimore Lane, Walton-on-Thames, Surrey. (Class 17; December 2 1959).

SAGA (790,797) Anti-vibration mountunits, anti-vibration mountings, couplings and resilient joints, all made of natural rubber, synthetic rubber, plastics, metal or of combinations of two or more of these materials; all for machines. Societá Applicazioni Gomma Antivibranti SAGA, Societá Per Azioni, Via Ripamonti No. 88 Milan, Italy; Address for service is c/o G. F. Redfern and Co., Redfern House, Dominion Street, London E.C.2. To be associated with No. 790,795 (4241,1315) and others. (Class 7; May 12 1959).

SAGA (790,795) Spring suspension units, anti-vibration mountings, couplings and resilient joints, all made of natural rubber, synthetic rubber, plastics, metal or of combinations of two or more of these materials; all for land vehicles, amphibious vehicles and for aircraft. Societá Applicazioni Gomma Antivibranti SAGA, Societá Per Azioni, Via Ripamonti No. 88 Milan, Italy. Address for service is c/o G. F. Redfern and Co., Redfern House, Dominion Street, London, E.C.2. To be Associated with No. 790,796 (4241,1317) and others. (Class 12; May 12 1959).

SAGA (790,797) Anti-vibration mountings made of natural rubber, synthetic rubber, plastics, metal or of combinations of two or more of these materials and being for use in building or civil engineering construction. Societá Applicazioni Gomma Antivibranti SAGA, Societá per Azioni, Via Ripamonti No. 88 Milan, Italy. Address for service is c/o G. F. Redfern and Co., Redfern House, Dominion Street, London, E.C.2. To be Associated with No. 790,795 (4241, 1315) and others. (Class 19; May 12 1959).

LANDMASTER (B788,790) Tyres of natural or synthetic rubber, retread strips for such tyres, inner tubes for tyres, air pumps for tyres, tyre valves, tyre repair outfits and patchings for tyres (not being cement or india rubber solution). Watts Tyre and Rubber Co. Ltd., Lydney Industrial Estate, Lydney, County of Gloucester. (Class 12; March 23 1959).

TUXELITE (789,745) Soles and heels, being goods made of rubber and synthetic resin and all for footwear. Tuck and Co. Ltd., Peregrine Road, Hainault, Ilford, Essex. To be Associated with No. 789,744 (4241,1317). (Class 25; April 17 1959).

TUXELITE (789,744) Sheet material made of rubber and synthetic resin, all for use in soling and heeling footwear. Tuck and Co. Ltd., Peregrine Road Hainault, Ilford, Essex. To be Associated with No. 789,745 (4241,1323). Class 17; April 17 1959).

GAYLITE (B789,179) Plastics included in Class 17 in sheet form. Linolite Ltd., The Mill Works, Burnivale, Malmesbury, Wiltshire. (Class 17; April 3 1959).

KNIGHTEX (791,847) Mechanical and luminous signs made of metal and plastic; and electrical apparatus included in Class 9 for use with such mechanical and luminous signs. Knight Electrics (Neon) Ltd., 54 Alsen Road, London, N.7. (Class 9; June 9 1959).

ADIMOLL (790,739) Plasticizers being chemical products for use in industry. Farbenfabriken Bayer Aktiengesellschaft, Bayerwerk, Leverkusen 22c, Germany. Address for service is c/o Carpmaels and Ransford, 24 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 1; December 23 1959).

SAGA (790,794) Anti-vibration mountings made of natural rubber, synthetic rubber, plastic, metal or of combinations of two or more of these materials and being for scientific and electrical apparatus and instruments included in Class 9, nautical, surveying, photographic, cinematographic, optical, weighing, measuring, signalling, checking (supervision) and for lifesaving apparatus and instruments. Societa Applicazioni Gomma Antivibranti S.A.G.A. Societa Per Azioni, Via Ripamonti No. 88, Milan, Italy. Address for service is c/o G. F. Redfern and Co., Redfern House, Dominion Street, London, E.C.2. To be associated with No. 790,793 (4241, 1313) and others. (Class 9; December 23 1959).

MAXYMIT (787,591) Gloves for surgical and medical purposes. Maxwell Plastics Ltd., 147 Orford Road, Walthamstow, London, E.17. (Class 10; December 23 1959).

graceline ARISTOCRAT

B790,549) Wash hand basins (being parts of water supply installations) having surrounds of plastics bonded to plywood. Graceline Units Ltd., Leyborne Wharf, Horton Bridge Road, West Drayton, Middlesex. To be Associated with No. B775,004 (4186, 997). (Class 11; December 23 1959).

MAXI MILER (786,931) Tyres and inner tubes therefor. Henley's Tyre and Rubber Co. Ltd., Bath Road, Melksham, Wiltshire. (Class 12; December 23 1959).

DIAMATIC (794,284) Tyres of rubber or plastics, all for vehicle wheels. Geo. H. Hughes Ltd., Edgemond Avenue, Tyburn, Birmingham 24. (Class 12; December 23 1959).

DOMOSIC (780,229) Pipes included in Class 17 made of plastics; sound insulating panels, hand rails of rubber or of imitation rubber; and corrugated sheets of polyester resin plastics re-inforced with glass fibres, the plastics predominating; and mouldings, all included in Class 17. Domosic S.P.A., Via Filippo Turati 3, Milan, Italy. Address for service is c/o Reddie and Grose, 6 Bream's Buildings, London, E.C.4. To be Associated with No. 780,230 (4243, 1388). (Class 17; December 23 1959).

MARLICA (794,524) Furniture and parts thereof included in Class 20, all made of laminated plastics. The Marley Tile Co. Ltd., London Road, Riverhead, Sevenoaks, Kent. (Class 20; December 23 1959).

CHILL-JAK (B793,381) Coolers made of foamed plastics for beverages and for food. Insulex Ltd., Insulex House, 67 Westbourne Grove, London, W.2. (Class 21; December 23 1959).

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on January 13 1960

K. Ziegler. Process for the production of high molecular weight polythenes. 826,638.

Rohm and Haas Co. Polymerizable organic sulphides and polymers thereof. 826,659.

Farbenfabriken Bayer A.G. Method for producing polyurethane plastics. 826,622.

Koppers Co. Inc. Polymerization process. 826,561.

N.V., De Bataafsche Petroleum Maatschappij. Compositions containing polyepoxide and polyaminodiphenyl sulphones. 826,534.

Farbenfabriken Bayer A.G. Apparatus for thoroughly mixing the components of a synthetic resin. 826,623.

K. Ziegler. Catalysts for the polymerization of ethylene. 826,639.

NEW COMPANIES

Crescent Wire Works Ltd. (642,528).—November 20. Capital: £10,000 in £1 shares. To carry on the business of manufacturers of and dealers in metal and plastic materials, etc. The directors are: William H. Land, Pinners Hall, Austin Friars, E.C.2; Anthony J. Hollis, 5 Cyprus Road, N.3. Regd. office: 3 Boutflower Road, S.W.11.

Nagolle Holdings Ltd. (644,780). —December 17. Capital: £100 in 5s. shares. To acquire the whole or any part of the issued share capital of the Nagolle (Ceylon) Rubber and Tea Plantations Ltd. or the whole or any part of its undertaking, property and assets, etc. Other particulars are similar to Doloswella Holdings Ltd. (q.v.).

Pelmadulla Holdings Ltd. (644,786). —December 17. Capital £100 in £1 shares. To acquire the whole or any part of the issued share capital of Pelmadulla Tea and Rubber Company Ltd., etc. Other particulars similar to Mahawale Holdings Ltd. (q.v.).

S. G. Tapes Ltd. (645,557).—December 24. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in fabric, plastic and adhesive tapes, etc. The directors are: Bernard H. Smith, 15 Ruskin Road, Old Trafford, Manchester 16, Frank Sheldon, 'Glencoe,' 71 Nipper Lane, Whitefield, Lancs. Regd. office: 79 Oswald Road, Chorlton-cum-Hardy, Manchester 21.

Triple Plastics (Manchester) Ltd. (645,498).—December 24. Capital: £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in plastic, etc. The directors are: Alan Glass, 4 Birkdale Street, Manchester 8, Isaac Spack, 16 Roston Road, Salford 7, Benny Paulden, 6 Edgeware Avenue, Prestwich. Regd. office: 196 Deansgate, Manchester 3.

E. H. H. Holdings Ltd. (645,352)—December 23. Capital: £200 in £1 shares. Objects: To acquire any shares or other interests of any company carrying on the business of manufacturers, importers and repairers of and dealers in furniture, bedding upholstery, building and plastic materials, etc. The directors are: William J. Hayden, The Old Rectory, Mundesley, Norfolk, Trevor G. Sexty, 124 Thorpe Road, Norwich.

Willsmore Tyre Service Ltd. (645,334).—December 23. Capital: £1,000 in £1 shares. The directors are: William F. Clogg and Mary Clogg, both of 41 Minster Way, Hornchurch, Essex. Regd. office: Colchester Road, Gallows Corner, Romford, Essex.

Larkhill Rubber Co. Ltd. (645,158).—December 22. Capital: £100 in £1 shares. To carry on the business of buyers, sellers, and manufacturers of and dealers in, for the footwear and other trades, all kinds of rubber and synthetic rubber products, etc. The first directors are to be appointed by the subscribers. Solicitors: Slaughter and May, 18 Austin Friars, E.C.2.

Dobson Holness Ltd. (645,729).—December 29. Capital: £1,000 in £1 shares. To carry on the business of mechanical and electrical engineers, welders, metal workers, plastic moulders, etc. The directors are: Vincent H. Dobson, 24 Colin Crescent, N.W.9, John F. S. Holness, 30 Crescent East, Hadley Wood, Herts. Secretary: N. St. G. Wise. Regd. office: 3 Berkeley Square, W.1.

P. S. Braggs and Co. Ltd. (645,166).—December 22. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in rubber, etc. The directors are: Philip S. Braggs and Betty I. Braggs, both of 56 Englewood Road, S.W.12. Regd. office: Rear of 25 Balham Hill, S.W.12.

Randle, Cleworth and Co. Ltd. (645,167). —December 22. Capital: £1,000 in £1 shares. To carry on the business of manufacturers, bonders and fabricators of plastics, etc. The directors are: John A. Cleworth and Mrs. Cicely Cleworth, both of 54 Ivy Road, Macclesfield, Mrs. Margaret E. Kay, 4 Denison Road, Hazel Grove. Regd. office: Calamine Street, Macclesfield.

R.K.M. Products Ltd. (645,815).—December 30. Capital: £100 in £1 shares. To acquire patents, manufacturers of and dealers in plastics, plastic materials, etc. The permanent directors are: Richard K. Matthews (chairman), Moorsfield House, Audlem, near Crewe; Kenneth H. Riggall, Grove Cottage, Acton, near Nantwich. Regd. office: Westminster Bank Chambers, High Street, Nantwich, Cheshire.

Triomac (Plastic Mouldings) Ltd. (645,846).—December 30. Capital: £1,000 in £1 shares. The directors are: Walter H. Macnally and Mrs Alice Macnally, both of 6 Sheerwater Road, Woking. Regd. office: 48 Windsor Street, Chertsey, Surrey.

Norfibre Ltd. (645,865).—December 31. Capital: £1,000 in £1 shares. To acquire the business of 'Norfibre' carried on by John H. Jakes and Allan R. Robertson at 58 King Street, Norwich, and to carry on the business of manufacturers of and dealers in plastics, etc. The directors are: John H. Jakes, Whitegates, Horning, Norfolk; Allan R. Robertson, 167 Rupert Street, Norwich. Regd. office: 62 West Pottergate, Norwich.

Reads of Bradford Ltd. (646,337).—January 5. Capital: £2,000 in £1 shares. To carry on the business of manufacturers of and dealers in foam rubber, sponge, soft, natural and synthetic rubber, plastic foams, etc. The directors are: Abraham W. Read, 289 Killinghall Road, Bradford, 3; Maurice E. Crowther, 1 Fourth Avenue, Bradford, 3. Regd. office: 387 Leeds Road, Bradford, 3.

COUNTY COURT JUDGMENTS

NOTE.—*These Judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the praties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgment are not returned to the Registry if satisfied in Court Books within twenty-one days.*

GUPA-P TYRES, 20b Wessex Road, Parkstone, Poole, Hants. Brentford, £16, November 2 1959.

A AND B TYRE COMPANY, 131 Stoke Newington Church Street, N.16, London. Tyre dealer, Westminster, £27, November 13 1959.

L. M. HOWELL (T/A L.M. PLASTICS), 4 Regent Street, Leamington Spa, Warwicks. Warwick, £33 17s. 6d., November 12 1959.

THE ROCKS PLASTIC FOAM CO. LTD., 1 Hammerwood Road, Ashurst Wood, near East Grinstead, Sussex. Mayor's and City, £76 17s., October 13 1959.

JOHN VANNER, 48 Nelmes Way, Hornchurch, Essex, asbestos manufacturer. Ilford, £47 2s., November 9 1959.

Increases of Capital

West End Mouldings Ltd. (629,028).—Moulders, manufacturers of and dealers in plastic substances, etc., 87/89 Baker Street, W.1. Increased by £4,900 in £1 ordinary shares, beyond the registered capital of £100.

Latest Wills

Mr Alfred Rose, of 886 Chester Road, Erdington, Birmingham, late operating manager, Dunlop Rubber Co., who died on September 22 1959, left £9,180 gross, £9,112 net value.

Rubber Journal and International Plastics **CLASSIFIED ADVERTISEMENTS**

APPOINTMENTS VACANT

6d. a word, Minimum 10/- Box 2/-

ASSISTANT rubber technologist, L.I.R.I., production experience of footwear compounds. Excellent prospects.—Sam Kay Rubber Co. Ltd., Hope Mill, Portwood Place, Stockport, Cheshire. (31)

A WELL-KNOWN company has a vacancy in Malaya for an unmarried man aged 20-30 for work in latex processing factories. Chemical training to at least intermediate science standard required with some experience in a works laboratory or process control (not necessarily in rubber). Salary not less than (but according to qualifications and experience) £945 per annum plus cost of living allowance £105 per annum. Free living quarters provided. Provident Fund, free passages, with 6 months' full pay home leave after 4 years' service.—Apply in first instance to Harrisons and Crosfield Limited (Latex), 1-4 Great Tower Street, London, E.C.3. (40)

FIRST-CLASS rubber chemist to take charge of laboratory in substantial Home Counties works, producing wide variety of mouldings and extrusions. Replies in confidence with full details of experience.—Box 39. (39)

MANAGER for moulding department in Hertfordshire. Experienced and used to full responsibility for labour control and maximum production. Excellent prospects for keen energetic applicant.—Apply Box 43. (43)

APPOINTMENTS VACANT

SENIOR RUBBER TECHNOLOGISTS

required for an expanding

RESEARCH AND DEVELOPMENT CENTRE

in

MIDLANDS

for interesting work in wide range of activities. Candidates will probably be aged 27 to 40, with A.I.R.I. and/or A.P.I., A.R.I.C., B.Sc., etc., also some experience in one or more of the following fields:—

ADHESIVES

BONDING OF RUBBER TO METAL AND OTHER MATERIALS

CONVEYOR and/or TRANSMISSION BELTING

HOSE

INFLATABLE EQUIPMENT

MOULDED MECHANICALS

Such men, who consider themselves worthy of excellent prospects with a commencing salary in region of £1,200 p.a. should send full education and career details to Box 38. (38)

APPOINTMENTS VACANT

RUBBER TECHNOLOGISTS

North British Rubber and U.S. Rubber of America has several interesting vacancies for rubber technologists in the technical and development group at their Edinburgh factory. The company manufactures a wide range of products, which provide plenty of scope for well trained men of initiative, with experience of compounding, production of hose, automotive products, mouldings and spreading of PVC and rubber. Candidates aged 30-40 should be of A.I.R.I. standard or equivalent, and be able to develop projects to the production stage. The position offers excellent prospects of advancement and salaries will be in line with responsibility involved and will be attractive to selected candidates. Company benefits include a contributory superannuation scheme and free life assurance. The company are also prepared to assist with removal expenses. Applications marked R.T., giving full details of qualifications, experience and age, should be addressed to Industrial Relations Division, The North British Rubber Co. Ltd., P.O. Box 47, Castle Mills, Edinburgh, 3. (42)

CHEMIST required for research and development in connection with plastic foams. The candidate should have a degree or equivalent in chemistry with physics as a subsidiary subject. Excellent prospects for advancement in a rapidly expanding industry. The company concerned is in the Manchester area.—Please state age, experience, qualifications and salary required to Box 52. (52)

INDUSTRIAL engineer required by company in Leicester employing about 1,000. Successful applicant will take contol of existing work study, labour control, and material control sections, and will have the prospect of advancing to a more senior position. Several years experience backed by degree or professional qualification essential.—Please reply giving details of experience, qualifications, age and present or expected salary to Box 32. (32)

RUBBER technologist, L.I.R.I. or A.I.R.I. standard, required for a well-known company in the Manchester area. B.A.C. wage scales apply and facilities are granted for part-time studies.—Box 35. (35)

SENIOR assistant, 22-30 years of age (free from National Service obligations), required to control physical testing section in laboratory of rubber company in the Manchester area. Experience of physical testing essential, and education at L.I.R.I. standard preferred.—Apply giving full details of age, education, experience and salary required, to Box 51. (51)

MONSANTO CHEMICALS LIMITED

have vacancies in the

APPLICATION RESEARCH LABORATORIES

(near London)

1. Young graduate to undertake research in the field of rubber chemicals. The work will be concerned largely with studies of technological problems associated with the use of chemical additives in rubber manufacture, principally accelerators and antidegradants, and with development work on new products.
Applicants should possess a First or Second Class Honours Degree, and should be interested in the physical chemical properties of rubber-like materials. Additional experience of work with high polymers will be an advantage.

2. Rubber technologist of good personality and ability to undertake technical service and development work in the field of rubber chemicals, principally accelerators, antidegradants and resin rubbers. In addition to laboratory investigations the work will include contact with customers and active co-operation with other departments of the company in development of new products.
Applicants should possess a First or Second Class Honours Degree in Chemistry, A.I.R.I., or equivalent qualifications and preferably should have had two or more years' technical experience in the rubber industry.

Salary commensurate with qualifications and experience; non-contributory pension scheme.

Please send written applications giving details of age, qualifications, experience, and quoting the reference number to DL.121, Personnel Department, Monsanto Chemicals Limited, Monsanto House, 10/18 Victoria Street, London, S.W.1. (385)

APPOINTMENTS VACANT
(continued)

RESEARCH steward required at the National College of Rubber Technology, Holloway Road, London, N.7, to assist with research work under the direction of the Head of the College. The work will include the operation of an infra-red spectrometer, but a suitably qualified chemist or physicist could be given initial training. Salary scale, £580 by annual increments to £675 with possibility of proceeding to maximum of £795.—Apply in writing giving full particular of age, qualifications, experience, etc., to the Clerk. (45)

PROCESS CONTROL

A young energetic man experienced in controlling all aspects of mill room and press shop procedure is required in an expanding organisation producing precision mouldings. A strong firm personality with initiative and an ability to work with a minimum of supervision are necessary qualifications. This post offers unique opportunity and a good salary will be paid to the right man, who should preferably have had some laboratory training.

Apply CHIEF CHEMIST,
B.A.L. & THOMAS BOORN & CO., LTD.,
Oakeywell Street, Dudley, Worcs.
(26)

ARTICLES FOR SALE (SECONDHAND)

6d. a word, Minimum 12/6 **Box 2/-**

60IN. x 22in. Bridge mill with 100 h.p. drive. K4 Intermix with 110 h.p. drive. 48in. x 18in. Shaw 3-bowl calender with variable-speed drive. 450-ton six-daylight press, platens 54in. square.—Reed Brothers (Engineering) Ltd., Replant Works, Woolwich Industrial Estate, London, S.E.18. Tel. Woolwich 7611/6. (44)

600

COMPRESSOR SETS

FOR USE ON 400/440 VOLTS 3 PHASE 50 CYCLES SUPPLY WITH CONTROL GEAR

TWO — 688/674 c.f.m. C.P.T. 100/125 p.s.i.
TWO — 600 c.f.m. BROOM & WADE 100 p.s.i.
376 c.f.m. BELLIS & MORCOM 125 p.s.i.
320 c.f.m. CLIMAX ENGINEERING 100 p.s.i.
305 c.f.m. HOLMAN 100 p.s.i.
246 c.f.m. INGERSOLL RAND 100 p.s.i.
150 c.f.m. REAVELL 100 p.s.i.
100 c.f.m. REAVELL 120 p.s.i.

GEORGE COHEN

SONS & CO. LTD.

Wood Lane, London, W.12
(Shepherds Bush 2070)

Stanningley, Nr. Leeds
(Pudsey 2241)

ARTICLES FOR SALE (SECONDHAND)

(continued)

SOUTH coast rubber works has surplus plant for disposal. 40in. x 16in. Bridge open mixing mill (in work) with electric drive. Also bank of three 36in. x 16in. Shaw open mills on 1 shaft with reduction gear, but the mills could be separated. One hydraulic rubber bale cutter complete with electric motorised hydraulic pump.—Offers and enquiries to Box 49. (49)

APPOINTMENTS WANTED

6d. a word, Minimum 10/-. Box 2/-.

GENERAL works manager, age 40, requires similar situation. Capable of complete executive control. Familiar with modern techniques in mechanicals, hose, ebonite, microcellular sheeting, general footwear products, and preparation of unvulcanized blanks for moulded footwear.—Box 46. (46)

OVERSEAS appointment required. L.I.R.I. with 9 years' factory experience in development, production control and administration.—Box 47. (47)

SENIOR field executive seeks responsible position with reputable rubber manufacturers. Wide experience all branches (tyres excepted) in London, Midlands, Southern England and South Wales. Highest credentials.—Reply in strictest confidence to Box 48. (48)

ARTICLES WANTED

6d. a word, Minimum 12/6 Box 2/-

REQUIRED. Calendering capacity for frictioning heavy ducks up to 62in. width x 200 yard rolls. Please state capacity available.—Box 36. (36)

SOLUTION or dough mixers with 2 Z-shaped, horizontal paddles, as made by Richmond and Chandler, Latex Engineering, or Archibald Edmeston, with 1 to 3 cwts capacity.—Details of prices and location to Box 50. (50)

WANTED. Bale splitter. No dealers.—Details and prices to Box 41. (41)

AGENCIES and REPRESENTATIVES

BTR

require a

REPRESENTATIVE

for

EAST AND WEST RIDINGS OF YORKSHIRE

with sales experience of

CONVEYOR BELTING

and other

INDUSTRIAL RUBBER PRODUCTS

Good salary and prospects, pension, car, expenses.

Send details of education and experience, marked "Confidential," to:—

Group Personnel Officer (Ref. RY),

B.T.R. INDUSTRIES LTD.

Herga House,
Vincent Square, London, S.W.1. (37)

MISCELLANEOUS

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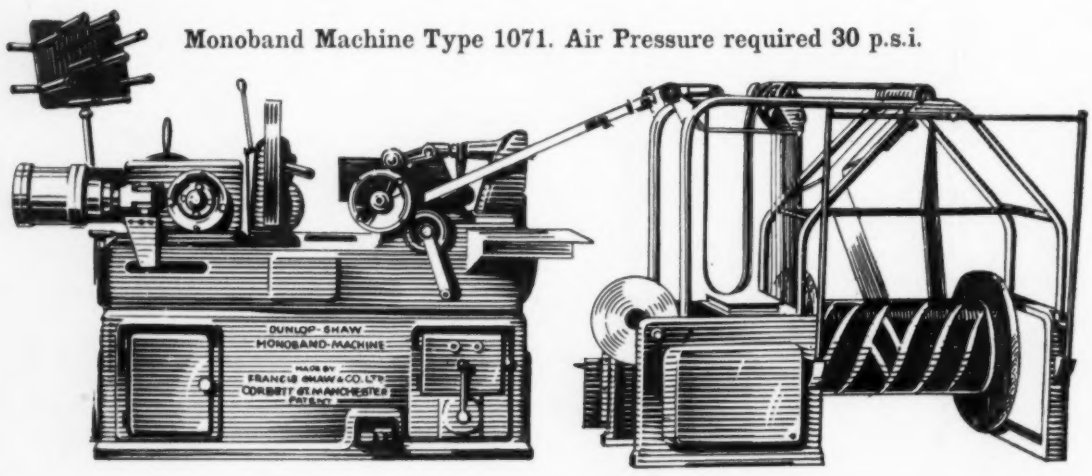

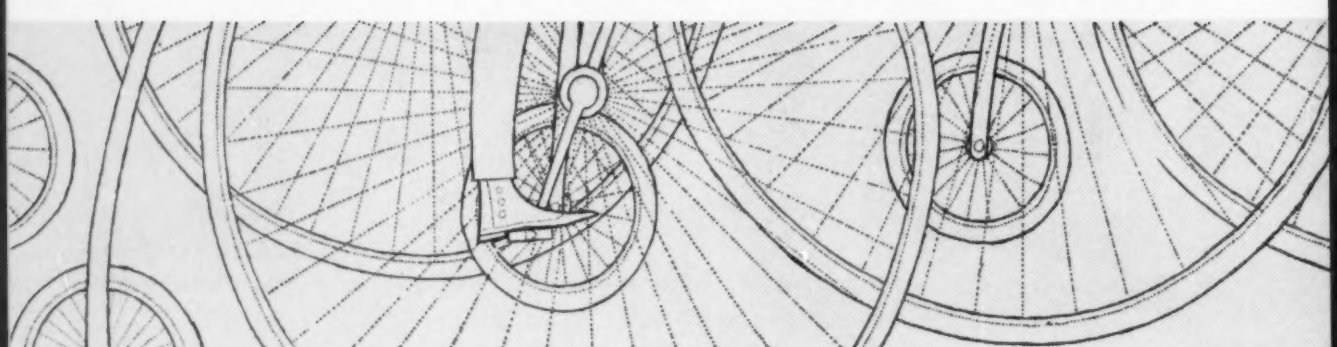

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